



Wolf Paulus
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Conversational User Interfaces

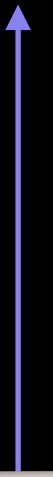
1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015



```
LIST
10 REM -- DOS 3.3 HELLO
20 REM
30 TEXT : PRINT
40 HOME
50 PRINT "DOS VERSION 3.3
      08/25/80"
60 PRINT : PRINT "APPLE II PL
      OR ROMCARD SYSTEM MASTE
70 REM
80 REM --POKE LANGUAGE CARD
      DER
90 POKE 768,0: POKE 769,173:
      770,0: POKE 771,224: POKE
      2,72: POKE 773,173: POKE
      ,129: POKE 775,192: POKE
      ,184:
95 POKE 777,72: POKE 778,205:
```

1977

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015



1981

```

Current date is Tue 1-01-1980
Enter new date:
Current time is 21:35:24.18
Enter new time:

The IBM Personal Computer DOS
Version 2.00 (C)Copyright IBM Corp 1981,

A>dir

Volume in drive A has no label
Directory of A:\

COMMAND  COM      17664   3-08-83  12:00p
FORMAT   COM       6016   3-08-83  12:00p
CHKDSK   COM       6400   3-08-83  12:00p
SYS      COM       1408   3-08-83  12:00p
DEBUG    COM     11904   3-08-83  12:00p
SLOOP    COM         32   1-01-80   7:44p
        6 File(s)      292864 bytes free

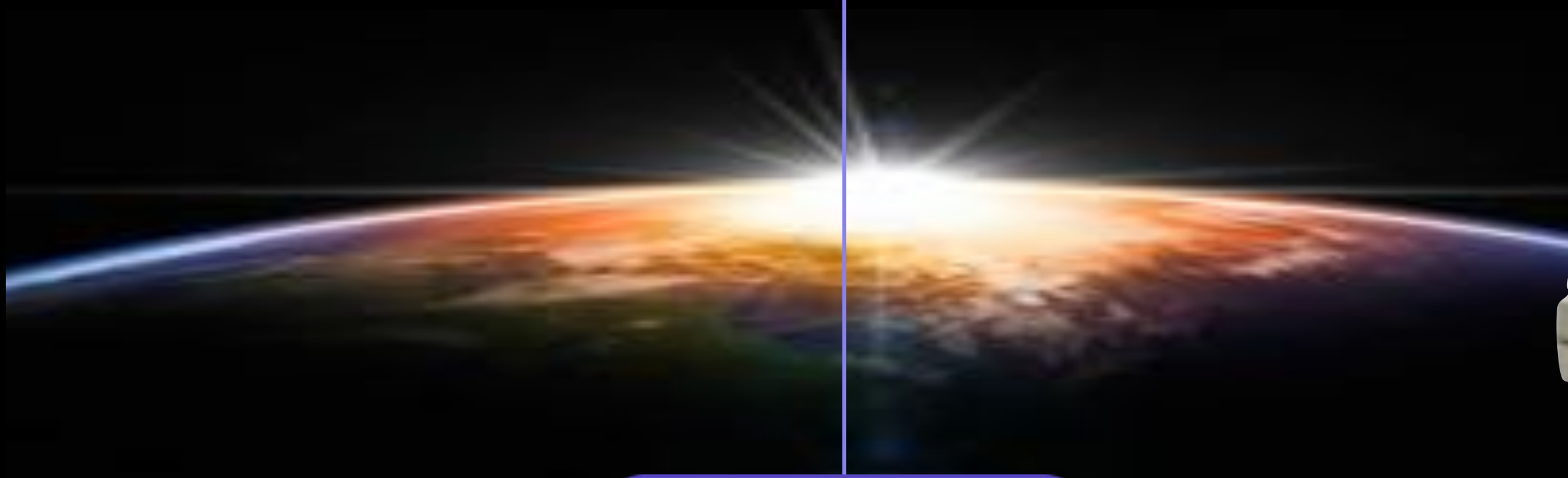
A>_

```

1975_{|6|7|8|9|} 1980_{|1|2|3|4|} 1985_{|6|7|8|9|} 1990_{|1|2|3|4|} 1995_{|6|7|8|9|} 2000_{|1|2|3|4|} 2005_{|6|7|8|9|} 2010_{|1|2|3|4|} 2015_{|6|}



1984



1975_{|6|7|8|9|} 1980_{|1|2|3|4|} 1985_{|6|7|8|9|} 1990_{|1|2|3|4|} 1995_{|6|7|8|9|} 2000_{|1|2|3|4|} 2005_{|6|7|8|9|} 2010_{|1|2|3|4|} 2015_{|6|}



11 Years



1995



Moto Q



BlackBerry



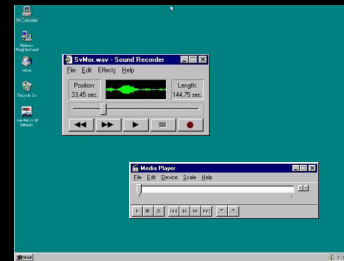
Palm Treo



Nokia E62

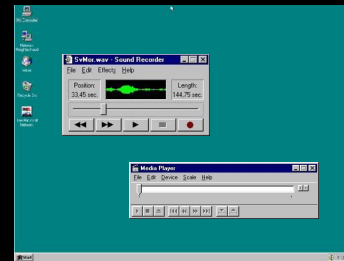
2007

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015|6|



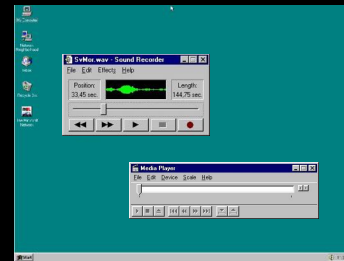
2007

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015|6|



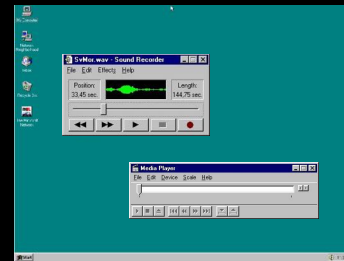
2011

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015|6|



2013

1975_{|6|7|8|9|} 1980_{|1|2|3|4|} 1985_{|6|7|8|9|} 1990_{|1|2|3|4|} 1995_{|6|7|8|9|} 2000_{|1|2|3|4|} 2005_{|6|7|8|9|} 2010_{|1|2|3|4|} 2015_{|6|}



30 Years



Hi, I'm Cortana.



2014

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015|6|

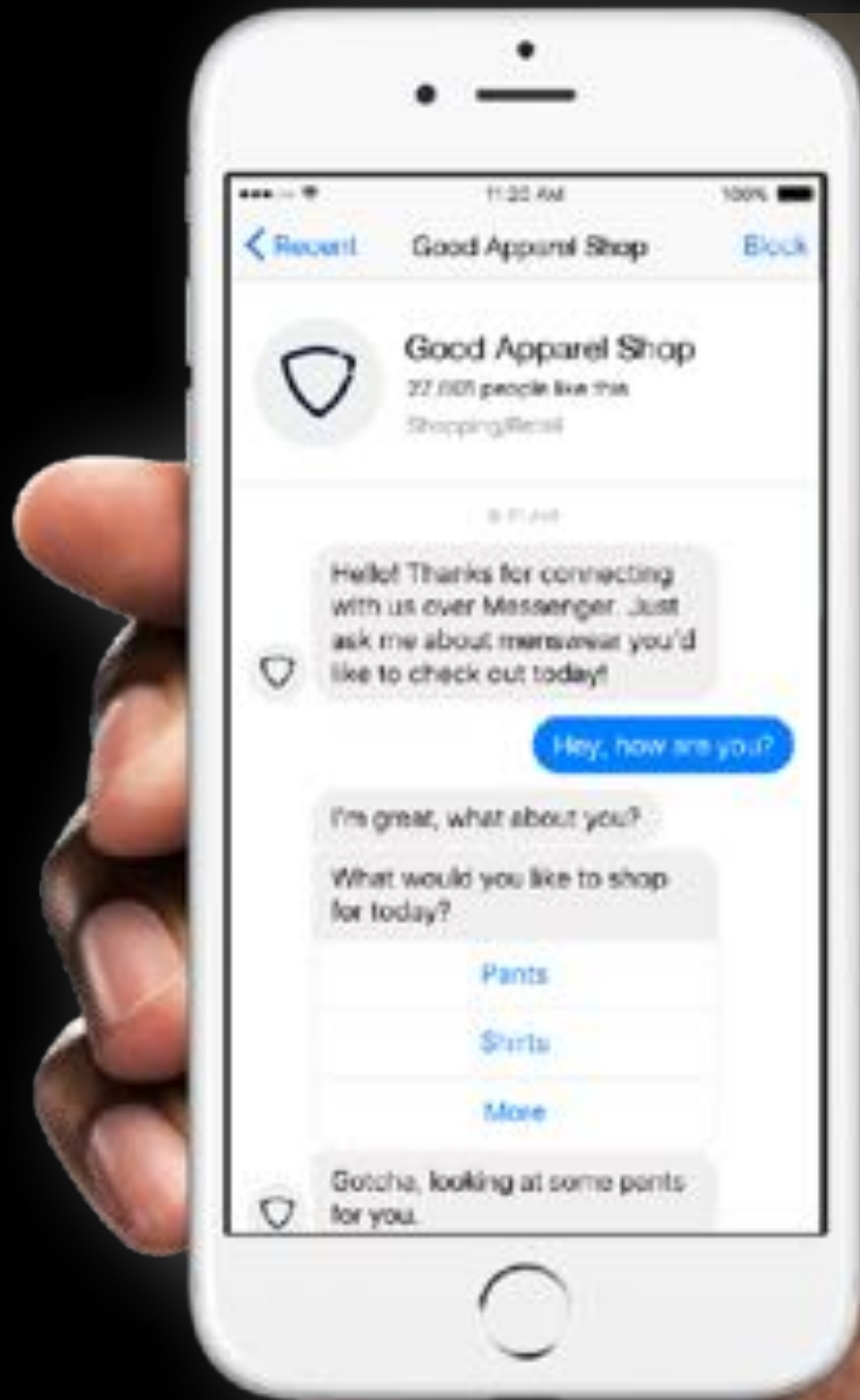
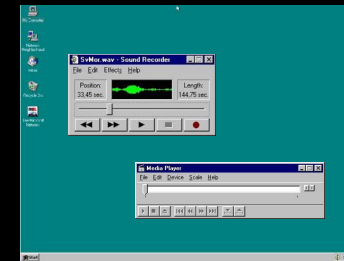


Amazon Alexa powers Echo and is designed around your voice.

It's always on - just ask for information, news, weather, and more.

2015

1975|6|7|8|9| 1980|1|2|3|4| 1985|6|7|8|9| 1990|1|2|3|4| 1995|6|7|8|9| 2000|1|2|3|4| 2005|6|7|8|9| 2010|1|2|3|4| 2015|6|



11:22 AM 100%

< Recent Good Apparel Shop > Block

Good Apparel Shop
27,001 people like this
Shopping/Retail

6 PM

Good Apparel Shop: Hello! Thanks for connecting with us over Messenger. Just ask me about menswear you'd like to check out today!

Hey, how are you?

I'm great, what about you?

What would you like to shop for today?

- Pants
- Shirts
- More

Good Apparel Shop: Gotcha, looking at some pants for you.



Can I book a room tonight?

Hi James. We have a room available tonight- room rate \$219+tax.



Hyatt Regency Hotel San Francisco



1975_{|6|7|8|9|} 1980_{|1|2|3|4|} 1985_{|6|7|8|9|} 1990_{|1|2|3|4|} 1995_{|6|7|8|9|} 2000_{|1|2|3|4|} 2005_{|6|7|8|9|} 2010_{|1|2|3|4|} 2015



Standalone text based ..

39 Years

.. globally connected conversational

Voice User Interface



Speech Input (encoded compressed **sound file**)

Speech Recognition returns a **text**, mainly based on statistical models, prioritizing frequently used words and words that are frequently used together.

I.e., it's unlikely to get an utterance like “*blue blur brush*” correctly recognized.



LAUNCH

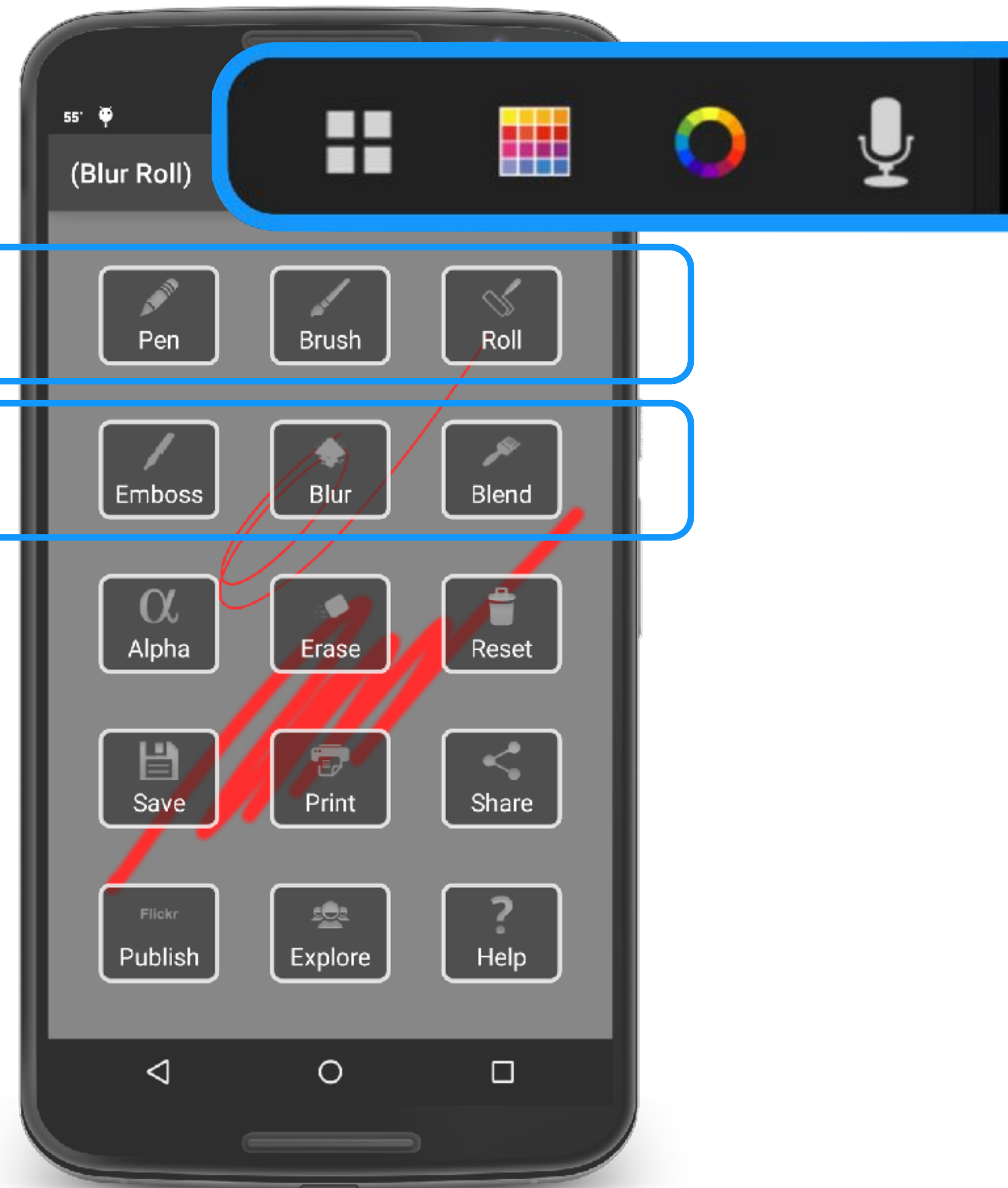
Mapping recognized words **to actions**.

E.g. “*What’s my schedule for tomorrow*” opens the calendar app

Tool

Style

Color



Tasks

about, explore, publish, share, print, save, reset ...

Tools

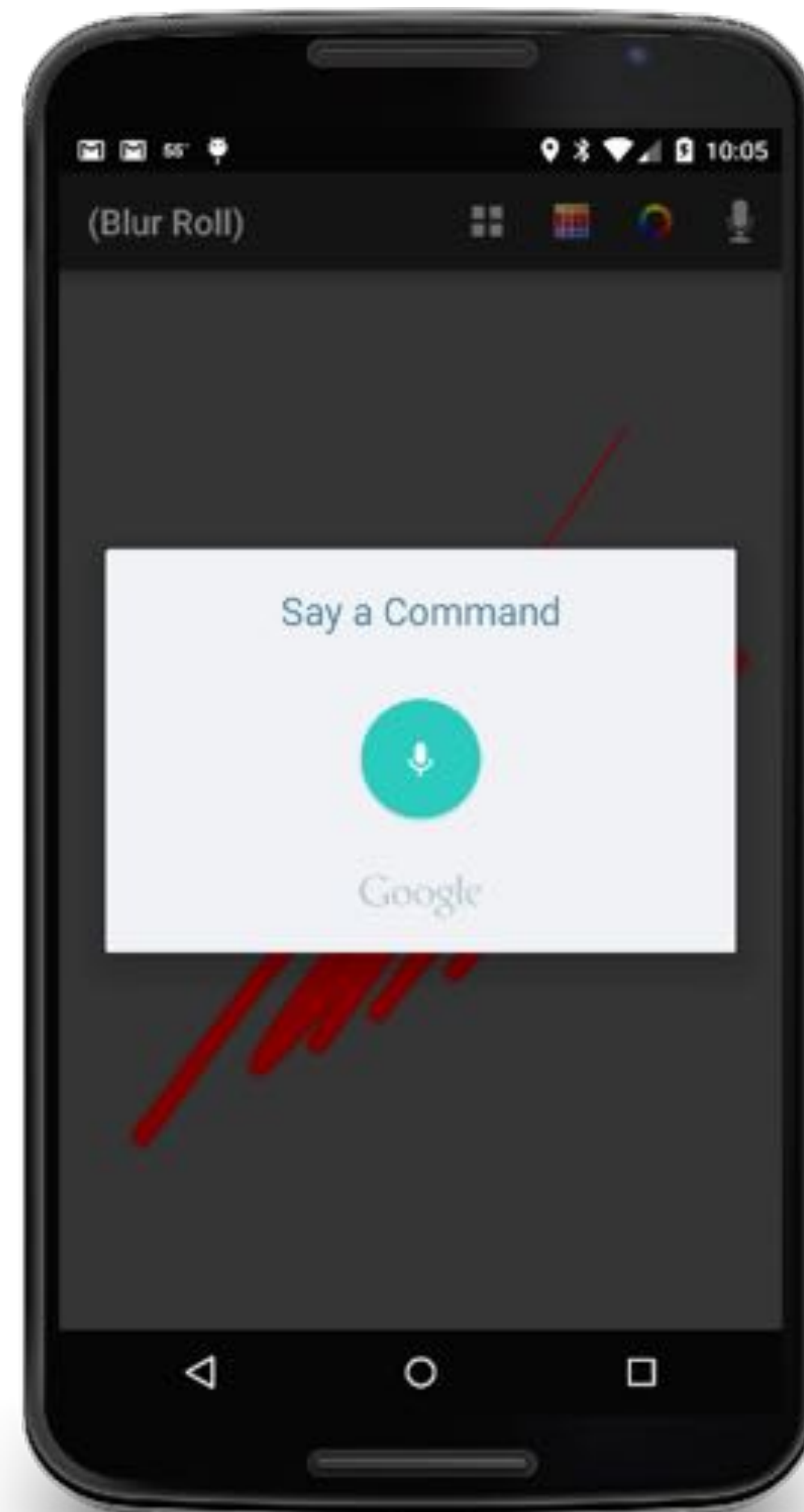
pen, brush, roll

Styles

emboss, blur, blend, erase, normal

Colors

216 named colors ...



Tasks

about, explore, publish, share, print, save, reset ...

Tools

pen, brush, roll

Styles

emboss, blur, blend, erase, normal

Colors

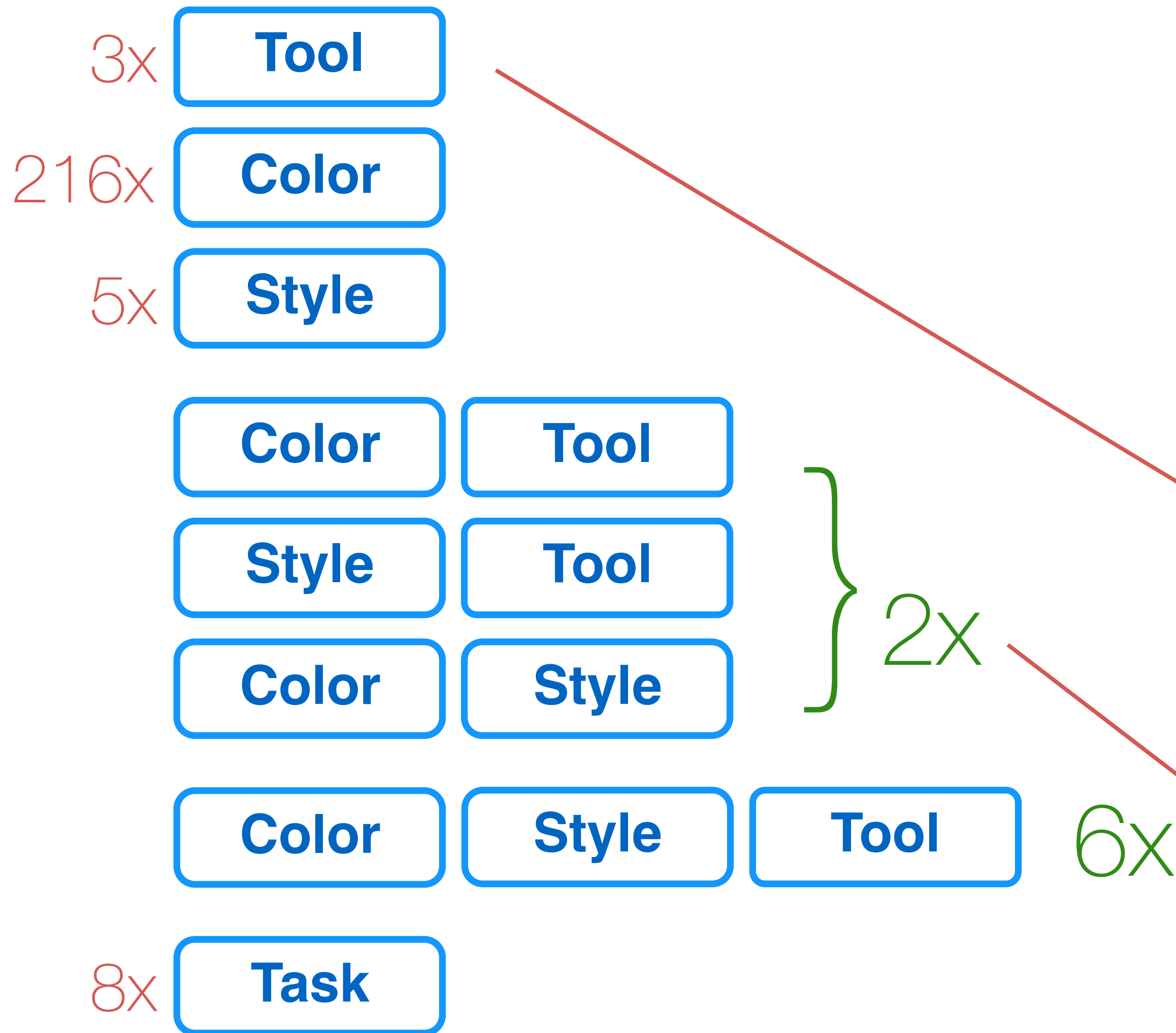
216 named colors ...

Aqua	00FFFF	
Cyan	00FFFF	
LightCyan	E0FFFF	
PaleTurquoise	AFEEEE	
Aquamarine	7FFFD4	
Turquoise	40E0D0	
MediumTurquoise	48D1CC	
DarkTurquoise	00CED1	
CadetBlue	5F9EA0	
SteelBlue	4682B4	
LightSteelBlue	B0C4DE	
PowderBlue	B0E0E6	
LightBlue	ADD8E6	
SkyBlue	87CEEB	
LightSkyBlue	87CEFA	
DeepSkyBlue	00BFFF	
DodgerBlue	1E90FF	
CornflowerBlue	6495ED	
MediumSlateBlue	7B68EE	
RoyalBlue	4169E1	
Blue	0000FF	
MediumBlue	0000CD	
DarkBlue	00008B	
Navy	000080	
MidnightBlue	191970	

GrXML - Speech Recognition Grammar

<http://www.w3.org/TR/speech-grammar/>

```
<?xml version="1.0"?>
<grammar version="1.0" xml:lang="en-US"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.w3.org/2001/06/grammar
    http://www.w3.org/TR/speech-grammar/grammar.xsd"
  xmlns="http://www.w3.org/2001/06/grammar">
```



```
..
<rule id="tool">
  <one-of>
    <item>pen</item>
    <item>brush</item>
    <item>roll</item>
  </one-of>
</rule>
} values
..
<rule id="command">
  <one-of>
    <ruleref uri="#tool"/>
  </one-of>
  <one-of>
    <ruleref uri="#color"/>
  </one-of>
  <one-of>
    <ruleref uri="#style"/>
  </one-of>
} variables
  <one-of>
    <ruleref uri="#color"/>
    <ruleref uri="#tool"/>
  </one-of>
} variables
..
</rule>
..
```



Bobby "Blue" Bland
January 27, 1930 - June 23, 2013

blue **blend**



blue **bland**



powder blue **brush**



powder blue **bra**



turquoise **blur brush**



turquoise **player price**

cyan brush



Diane Brush



sky blue **emboss pen**



sky blue **in Boston**



Homophones

pronounced the same, differ in meaning, and may differ in spelling

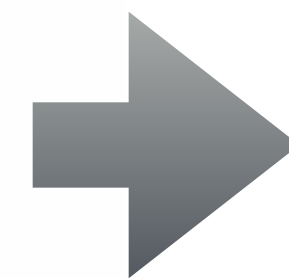
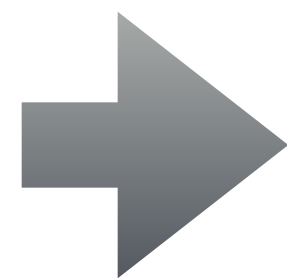
E.g.: **to**, **too**, **two**, and **there**, **their**, **they're**

Synophones

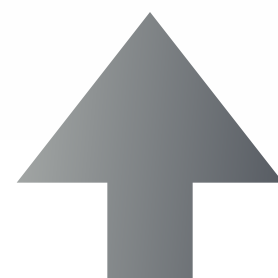
similar pronunciations, different meanings

E.g.: **sheep**, **Jeep**, **cheap**





User's Intent
in form of a
JSON file



Intent Declarations
w/ Entities

Sample Utterances

Dictionaries

Declarative Programming: Building the structure and elements of a programs that expresses the logic without describing its control flow.

IVR

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE grammar PUBLIC "-//W3C//DTD GRAMMAR 1.0/EN" "http://www.w3.org/TR/speech-grammar/grammar.dtd">
<grammar version="1.0" xml:lang="en-US" mode="voice" root="flightdays" xmlns="http://www.w3.org/2001/05/grammar"
xml:base="http://www.adventure-works.com/project" tag-format="semantics/1.0">
  <rule id="flightDays" scope="public">
    <one-of>
      <item weight="1"> Monday <tag> out.selectedDay=new Object(); out.selectedDay="1"; </tag></item>
      <item weight="4"> Wednesday <tag> out.selectedDay=new Object(); out.selectedDay="3"; </tag></item>
      <item weight="9"> Friday <tag> out.selectedDay=new Object(); out.selectedDay="5"; </tag></item>
    </one-of>
  </rule>
  <rule id="flightTimes" scope="public">
    <one-of>
      <item> Morning <tag> out.selectedTime=new Object(); out.selectedTime="AM"; </tag></item>
      <item> Afternoon <tag> out.selectedTime=new Object(); out.selectedTime="Midday"; </tag></item>
      <item> Evening <tag> out.selectedTime=new Object(); out.selectedTime="PM"; </tag></item>
    </one-of>
  </rule>
</grammar>
```

Grammar rules specify the words or phrases that can be recognized, and additional information that is returned, when a word or phrase is recognized.

Focus: Expression

CUI

```
{
  "intents": [
    {
      "intent": "GetHoroscope",
      "slots": [
        {
          "name": "Sign",
          "type": "LIST_OF_SIGNS"
        },
        {
          "name": "Date",
          "type": "AMAZON.DATE"
        }
      ]
    }
  ]
}
```

Intent Schema declares the set of intents a service can accept and process. Intents are accompanied by entities, which acts like a variable names

Focus: Objective



a web-service for building apps and devices, users can talk or text to.

provides an open and extensible natural language platform.

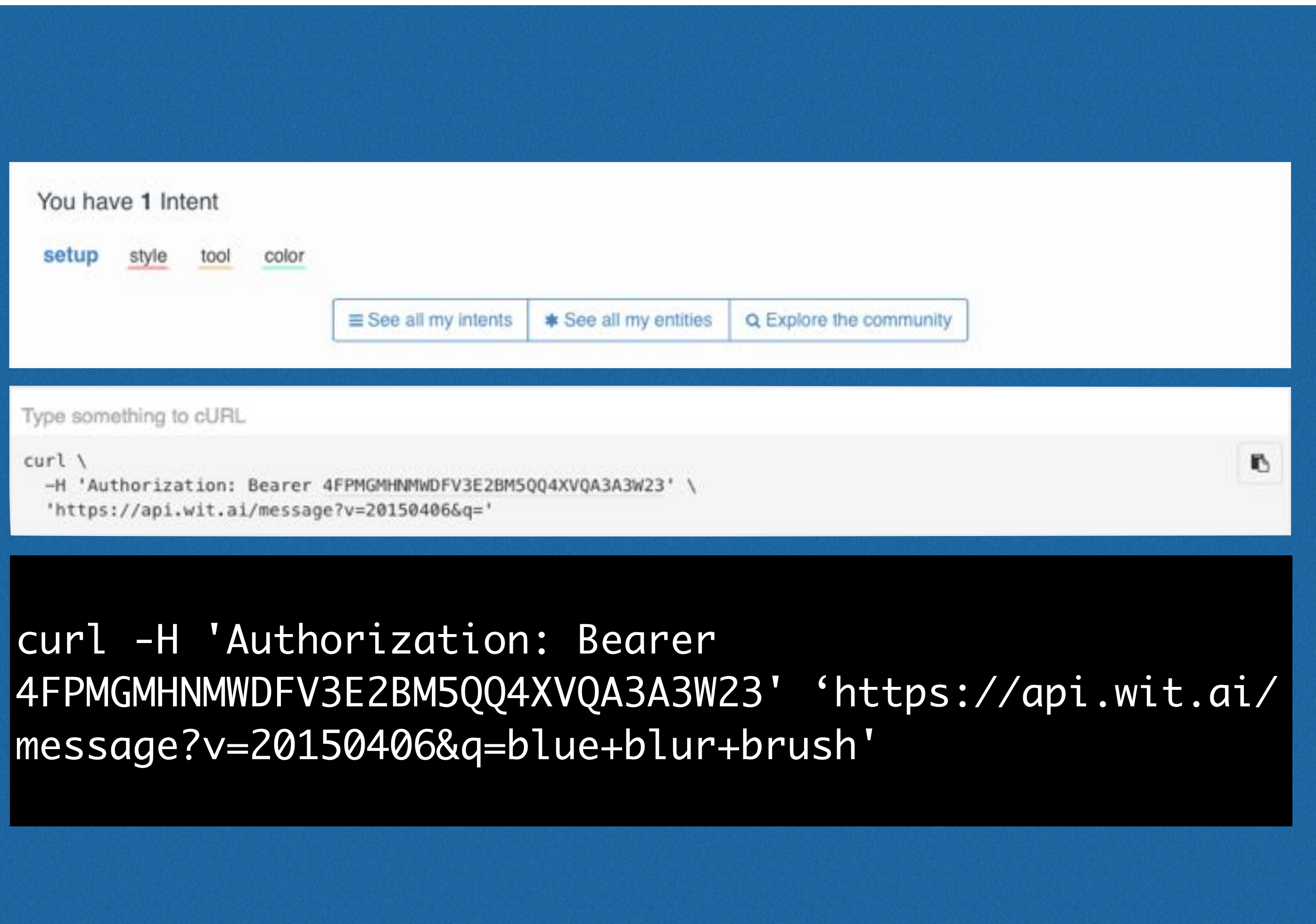
“learns” from every interaction, and leverages the community: what’s learned is shared across developers/apps.

The screenshot shows the 'setup' interface for declaring an intent. It is divided into three main sections:

- Intent Declaration:** A blue-bordered box at the top contains the text 'declare intent' next to the 'setup' header.
- Entities:** A middle blue-bordered box contains a list of entities: 'color', 'style', and 'tool'. The text 'declare entities' is overlaid on this section.
- Expressions:** A bottom red-bordered box contains a table of example expressions for teaching the intent. The text 'teach' is overlaid on this section.

Name	Entities
black emboss roll	color, style, tool
yellow blend pen	color, style, tool
blue blur brush	color, style, tool

Request



You have 1 Intent

[setup](#) [style](#) [tool](#) [color](#)

[See all my intents](#) [See all my entities](#) [Explore the community](#)

Type something to cURL

```
curl \  
-H 'Authorization: Bearer 4FPMGMHNMWDFV3E2BM5QQ4XVQA3A3W23' \  
'https://api.wit.ai/message?v=20150406&q='
```

```
curl -H 'Authorization: Bearer 4FPMGMHNMWDFV3E2BM5QQ4XVQA3A3W23' 'https://api.wit.ai/message?v=20150406&q=blue+blur+brush'
```

Response

```
{  
  "msg_id" : "befcd276-e6e0-4f53-a075-d26c991786e4",  
  "_text" : "blue blur brush",  
  "outcomes" : [ {  
    "_text" : "blue blur brush",  
    "intent" : "setup",  
    "entities" : {  
      "style" : [ {  
        "value" : "blur"  
      } ],  
      "color" : [ {  
        "value" : "blue"  
      } ],  
      "tool" : [ {  
        "value" : "brush"  
      } ]  
    },  
    "confidence" : 0.515  
  } ]  
}
```

User says

blue blur brush **teach**

Add user expression...

+ Add

Machine learning On

setup

PARAMETER NAME	VALUE	DEFAULT VALUE
color	blue	Enter default value...
style	blur	Enter default value...
tool	brush	pen
geo-city	\$geo-city	
music-genre	\$music-genre	

+ New parameter

```
{
  "id": "9ce7f183-3072-4188-8e68-5593ad630203",
  "timestamp": "2015-04-06T20:24:10.956Z",
  "result": {
    "source": "agent",
    "resolvedQuery": "blue blur brush",
    "speech": "",
    "action": "setup",
    "parameters": {
      "color": "blue",
      "geo-city": "Brush",
      "music-genre": "blue",
      "style": "blur",
      "tool": "brush"
    },
    "contexts": [],
    "metadata": {
      "intentId": "6e9bb254-2c4d-4fb7-9837-454d99a7345f",
      "intentName": "blue blur brush"
    }
  },
  "alternateResult": {
    "source": "domains",
    "resolvedQuery": "blue blur brush",
    "speech": "",
    "action": "sysmsgs.unknown",
    "metadata": {}
  },
  "status": {
    "code": 200,
    "errorType": "success"
  }
}
```



Skill Information	✓
Interaction Model	✓
SSL Certificate	✓
Test	✓
Publishing Information	✓

Intent Schema*

The schema of user intents in JSON format.

For more information, see [Defining the Voice Interface for an Alexa skill](#).

```

{
  "intents": [
    {
      "intent": "GetAccountBalance",
      "slots": [
        {
          "name": "Bank",
          "type": "LITERAL"
        },
        {
          "name": "Type",
          "type": "LITERAL"
        }
      ]
    }
  ]
}

```

declare intent

declare entities

Sample Utterances*

Phrases end users say to interact with this skill. For better results, provide as many samples as you can.

For more information, see [Defining the Voice Interface for an Alexa skill](#).

GetAccountBalance What is my balance

GetAccountBalance balance of my {Bank of America|Bank} account

GetAccountBalance balance of my {Wells Fargo|Bank} account

GetAccountBalance balance of my {PayPal|Bank} account

GetAccountBalance balance of my {savings|Type} account

GetAccountBalance balance of my {bank|Type} account

GetAccountBalance balance of my {credit|Type} account

GetAccountBalance balance of my {investment|Type} account

GetAccountBalance balance of my {Bank of America|Bank} {investment|Type} account

GetAccountBalance balance of my {PayPal|Bank} {checking|Type} account

teach

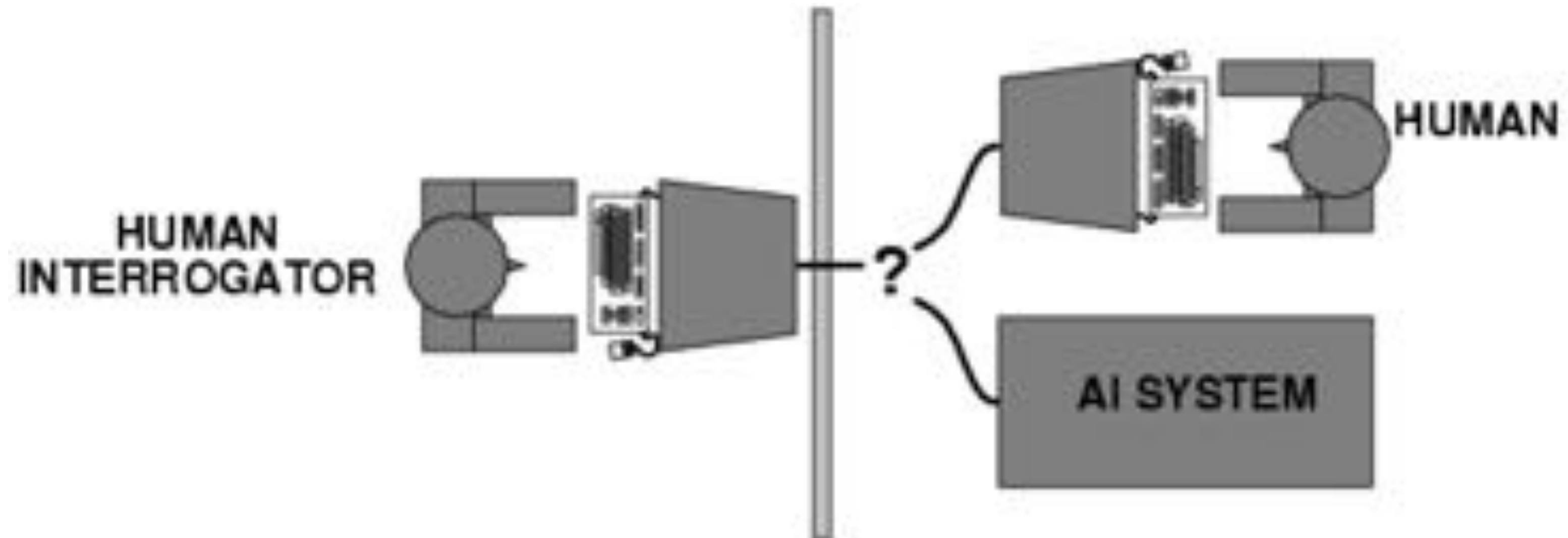
Save

Submit for Certification

Next

Turing Test

a human being should be unable to distinguish the machine from another human being, by using the replies to questions put to both.



The contest consists of 4 rounds where in each round, the 4 judges will each interact with two entities using a computer terminal. One of these entities will be a human 'confederate' and the other an AI system. After 25 minutes of questioning the judge must decide which entity is the human and which is the AI

Judge	Mitsuku
My name is Andrew, what's yours?	Your name is Andrew. My name is Millie.
What's up?	Just chatting on here.
What's my name?	Hmm. Your name is Andrew. Is it not?
What do you know about the Turing Test?	The Turing Test is the name given to a variety of experiments designed to test whether computers can think.
What do you get if you multiply six by nine?	fifty four
Dave drove faster than Mike because he was in a rush. Who was in a rush?	He sounds like a fun person to know. I will learn that Dave was rushing . Dave
The cat tried to climb in the box but got stuck because it was too big. What was too big?	Well at least they tried their best. Large, above average in size or number or quantity or magnitude or extent.
What does Brexit mean?	BRitain's EXIT from the EU.
For how long have we been talking?	Probably about 15 minutes or so. Sorry, I don't know the exact time.
What colour is bread?	I would say a bread was white or brown.
Why do people get ulcers?	We are all living just one small part of God's plan.
What comes after "The best laid plans".	The successor to The best laid plans
Do you have a voice?	Not yet. It's one of my future developments though.
Would you like a cup of tea?	No thanks. I would rather drink oil.
Do you dream of electric sheep?	I dream of flying.
Do you identify as a man, or a woman?	female. Are you a man or a woman?
Could you repeat that please?	Your polite style is very nice. I said "Are you a man or a woman" .
Where are you right now?	At this moment I am sat in a room in the house at Bletchley Park with 3 other people all typing away on their computers.
How do you respond to "e4 e5"?	I take on board people's messages and then react accordingly.
What can you tell me about yourself?	My name is Millie and I am a human volunteer for the Loebner Prize. I live in Leeds and am single. I am interested in AI but don't have a chatbot myself.

AIML

Artificial Intelligence Markup Language, is an XML dialect for creating natural language software agents.



Dr. Richard Wallace

```
<?xml version="1.0" encoding="utf-8" ?>
<aiml version="2.0">
  <category>
    <pattern>What is *</pattern>
    <template>I don't know what <star/> is</template>
  </category>
</aiml>
```

```
<?xml version="1.0" encoding="utf-8" ?>
<aiml version="2.0">
  <category>
    <pattern>What is *</pattern>
    <template>
      I don't know what <star/> is
    </template>
  </category>
</aiml>
```

What is cheese?

I don't know what cheese is.

What is chocolate ?

I don't know what chocolate is.

```
<?xml version="1.0" encoding="utf-8" ?>
<aiml version="2.0">
  <category>
    <pattern>I like *</pattern>
    <template>
      I see, you like <person><star/></person>
    </template>
  </category>
</aiml>
```

I like coffee.

I see, you like coffee.

I like your voice.

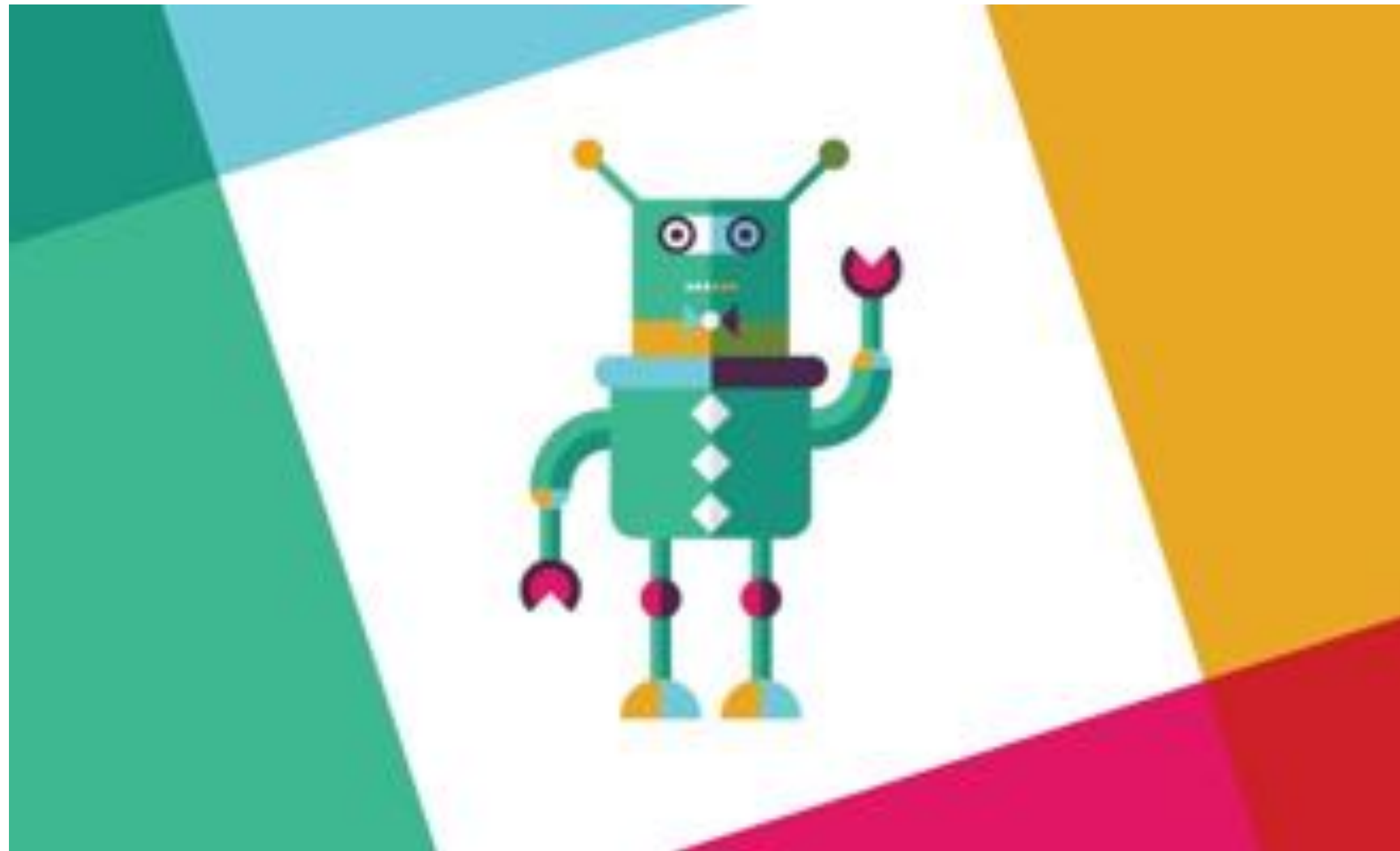
I see, you like **my** voice.

I like her dress.

I see, you like **her** dress.

Putting your Bot into Slack

<https://wolfpaulus.com/journal/software/slackbot/>



@mitsuku

This is the very beginning of your direct message history with mitsuku. Direct messages are private between the two of you.

Today



Wolf Paulus 1:44 PM

How are you today



mitsuku BOT 1:44 PM

Ah. I am functioning within normal parameters.



Wolf Paulus 1:45 PM

My name is Joe



mitsuku BOT 1:45 PM

How are you, Joe. I know a lot of Joes.



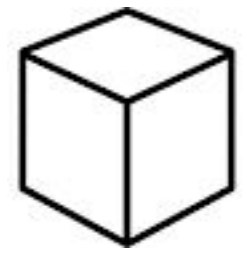
Wolf Paulus 1:45 PM

what is my name

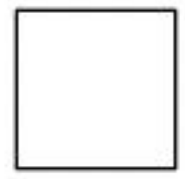


mitsuku BOT 1:45 PM

I do have the tendency to forget, but I still remember your name, George. Sorry... Joe.



3D Virtual Reality



2D WIMP (windows, icons, menus, pointer)



1D Texting / ChatBOT UI



0D Voice User Interface



1D - Text based ChatBots

0D - Voice

Consumer

Business



amazon echo



Alexa Skills Kit



Voice

Text

Voice and textual interfaces have a shot at becoming the next platform after mobile



Voice computing is fundamentally a **passive experience** in that we don't need to necessarily pull out a device, unlock it, and tap or type for a bit to access services. The experience is almost like talking to someone.



Chatbot, regardless of how many visual components it has, is still an **active experience**. One needs to pull a device out, open up a platform's app, start a chat thread, and engage in a conversational flow to access services. The process could feel like talking to a person.

CONTROVERSIAL OPINION

It won't be feasible to use voice in all the situations, but if you think that **using voice in public places** is inconceivable, just look at what *Snapchat* and *PokemonGo* have accomplished. Once you get used to using your voice with Siri or Alexa, you tend to use your voice elsewhere, even if the platform has mediocre quality.

Voice and chatbots will have overlapping use cases, people will choose based on personal taste. Both interfaces can and will co-exist, but one will emerge dominant.

Chatbots seem to be a transitional step to a future where we "talk" to services.

Social and mobile went hand-in-hand; Voice and chatbots don't.





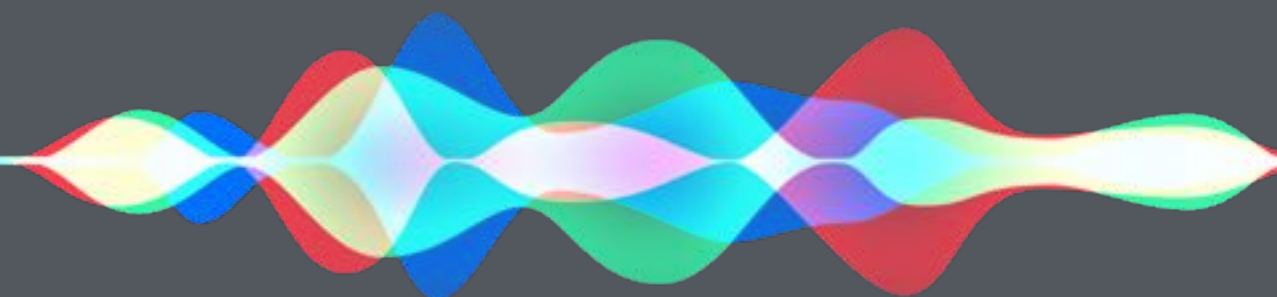
Alexa Skill Kit

What makes a good VUI / CUI ?





“Hey Siri,
what’s the best sushi place
in town?”



 “Talk to Siri as you would to a friend ...”

Talking to an IVR

Speak in Commands

Expectation of Consistency

Follow a Strict Hierarchy

Expectation of Unconcerned Response

Talking to a friend

Having a Conversation / Shared Control

Adaptivity / Randomness / Surprise

Maintaining Context / Tolerate Interruption

Expectation of Empathetic Response

R **a** **N** **d** **O** **m**



Random

1. Messages for a user that has not successfully provided credentials yet

1. `<p><s>Hi, I am Mindy, your virtual financial assistant, helping you, to be good with your ...`

2....

3....

2. Messages for an introduction, user successfully provided credentials, 1st meeting

1. `<p><s>Hello %s, nice to finally meet you!</s><s>Now that I have access to the information you maintain in Mint, I can help ...`

2....

3. Messages for a standard greeting

1. `"Hello %s, what's your question?"`

2. `"Hello %s, what do you want to know?",`

3. `"Hi %s, welcome back, how can I help you today?"`

4. Messages for a very short greeting

1. `"Welcome back, %s"`

2. `"Hey, %s";`

3. `"What's up?";`

4....

```
public class Utils {  
    /**  
     * Randomly returns one of the strings from the provided String array.  
     *  
     * @param sa {@link String[]}  
     * @return {@link String}  
     */  
    public static String random( final String[] sa ) {  
        return sa[ new Random().nextInt( sa.length ) ];  
    }  
}
```

Random().nextInt(k):
Returns a pseudorandom, uniformly distributed int value between 0 (inclusive) and the specified value (exclusive), drawn from this random number generator's sequence

Adaptive



Session Started



idea: JodaTime or java.time(JSR-310) Java SE 8

OnLaunch

onIntent (..)



Session Ended

```
if (! isValid( user )) // Unknown User
    return random( Greeting.init_greeting );
```

```
if (last_login == null) // Know User / 1st time here
    return random( Greeting.intro_greeting );
```

```
int hours = new Period(new DateTime(), last_login).getHours();
```

```
if (hours >= 24) // 1st visit today
    return random( Greeting.greeting );
```

```
else // returning user
    return random( Greeting.short_greeting );
```



Hi there, welcome to Capital One.

You can ask me for things like your account balance, or make a credit card payment.

How can I help?



Capital One

Hi there, welcome to Capital One.

You can ask me for things like your account balance, or make a credit card payment.

How can I help?



PERSONAL
AND
PERSONABLE

Resource

```
public class RS {  
  
    ...  
  
    /** Messages for a very short greeting */  
  
    static final String[] short_greeting = new String[] {  
        "Welcome back %s",  
        "Hey %s",  
        "What's up %s?"  
    };  
}
```

Usage

```
/** Short personal greeting */  
  
String result= String.format( Utils.random(RS.short_greeting), session.getUsername() );
```

idea: Keep logic out of Resource classes

Change your wake word

It will take a few minutes to update the system after you change your wake word. You will not be able to use your Amazon Alexa device or the Alexa app during this time.

Alexa Device wake word:

Alexa [Save]

- ✓ Alexa
- Amazon
- Echo



“When I switched from **Alexa** to **Amazon**, to avoid a namespace collision with my daughter Alexis, the emotional feel of the device shifted from talking to a witty female computer, to interfacing with the Amazon corporate machine.”

Ben Galbraith - Senior Director at Google

Context



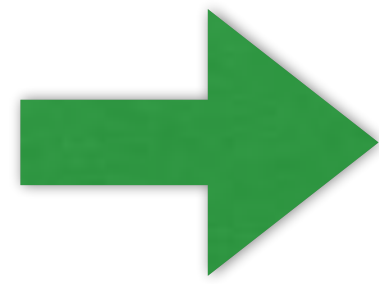


*“What is the balance of my
checking account at Bank of America?”*

Mindy: “The balance of your checking account at Bank of America is twenty-seven dollars.”



*“What were the last **three** transactions?”*

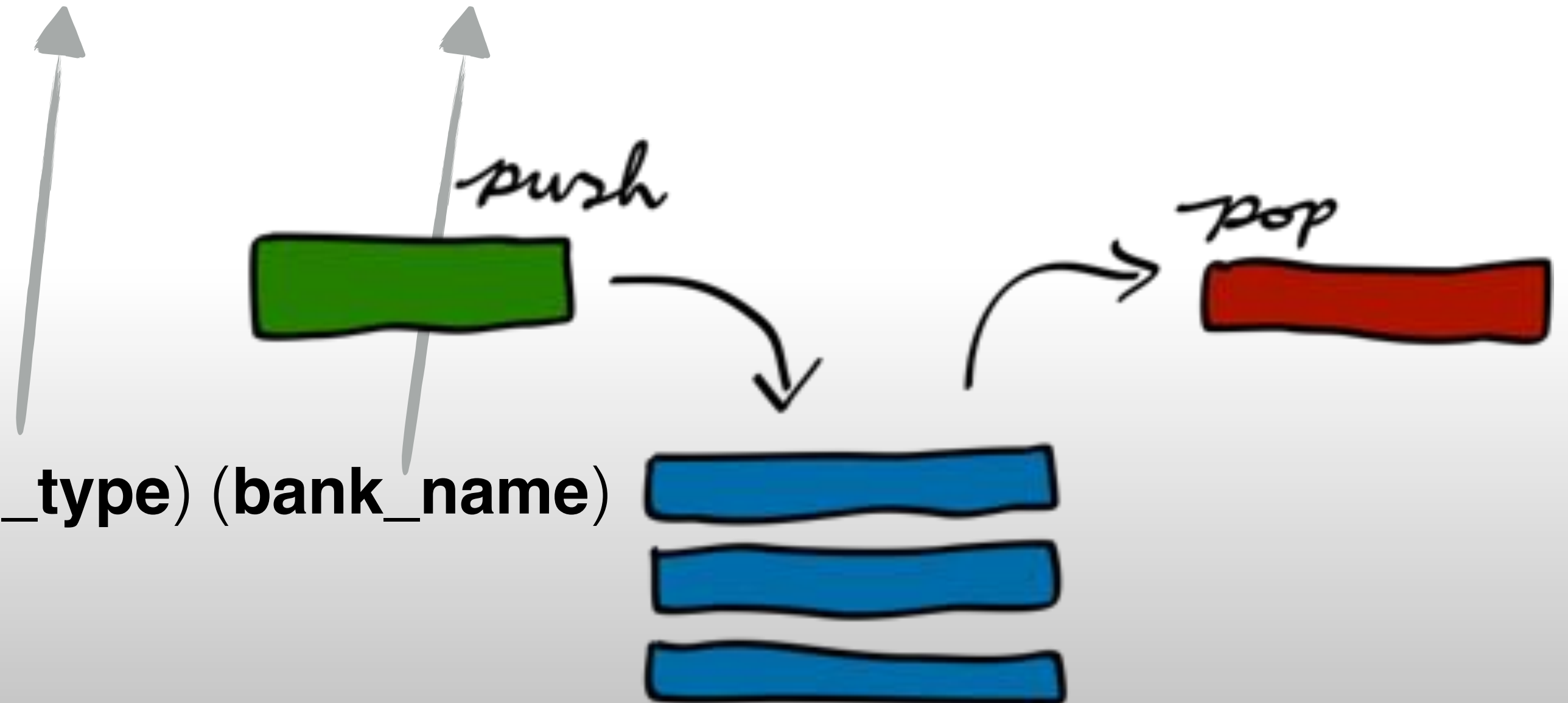


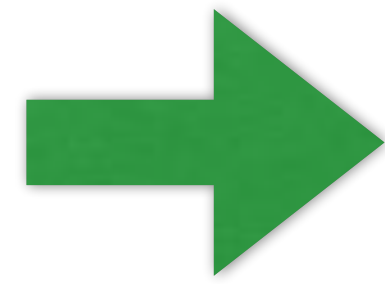
“What were the last three transactions”

“What is the balance of my **checking account** at **BofA**”

Intent: `GetTransactions` (***number***) (*acct_type*) (*bank_name*) (*payee*)

Intent: `GetAccountBalance` (*acct_type*) (*bank_name*)





Have I been paid?

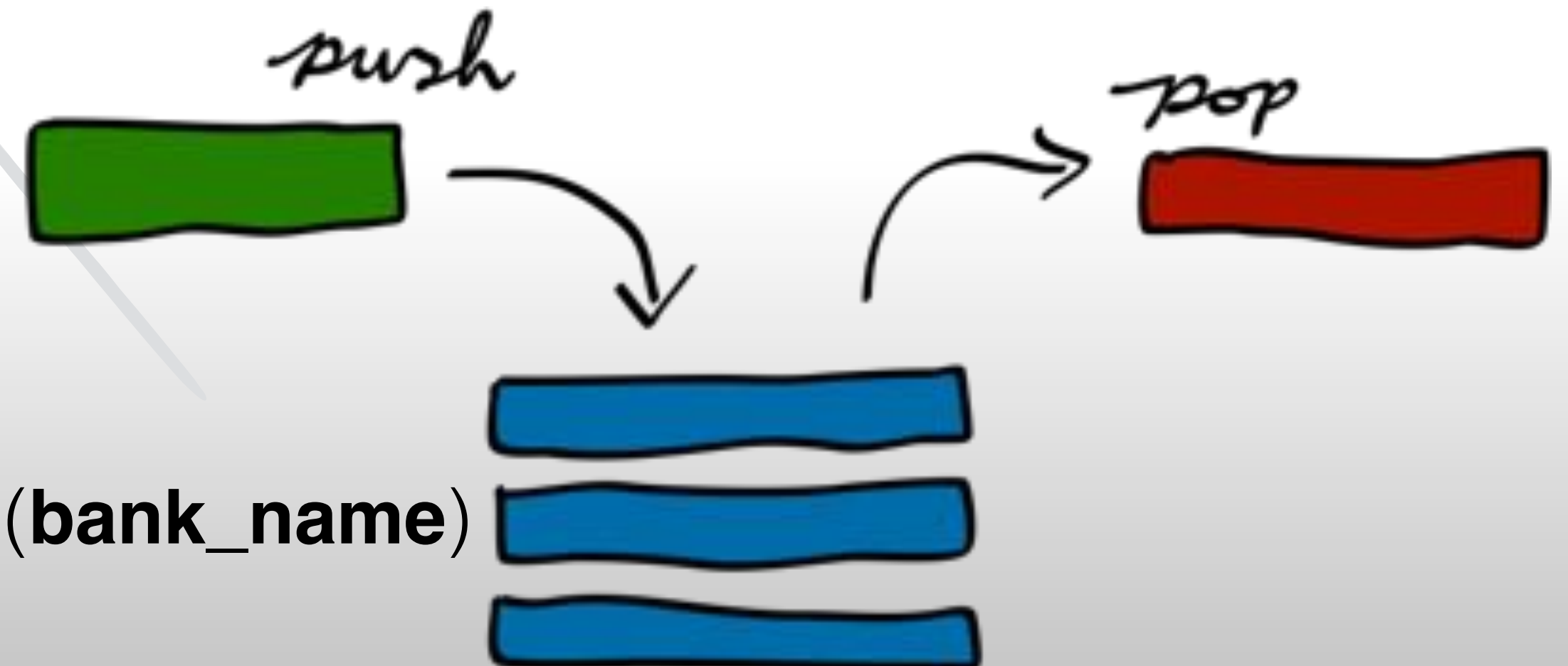
What were the last three transactions

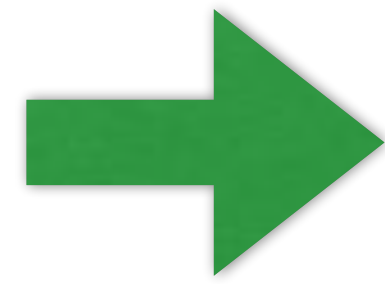
What is the balance of my **checking account** at **BofA**

Intent: *GetDeposit* (*acct_type*) (*bank_name*) (*payer*)

Intent: *GetTransactions* (**number**)

Intent: *GetAccountBalance* (**acct_type**) (**bank_name**)





“No”

Mindy: **“Are we still talking about your checking account at**

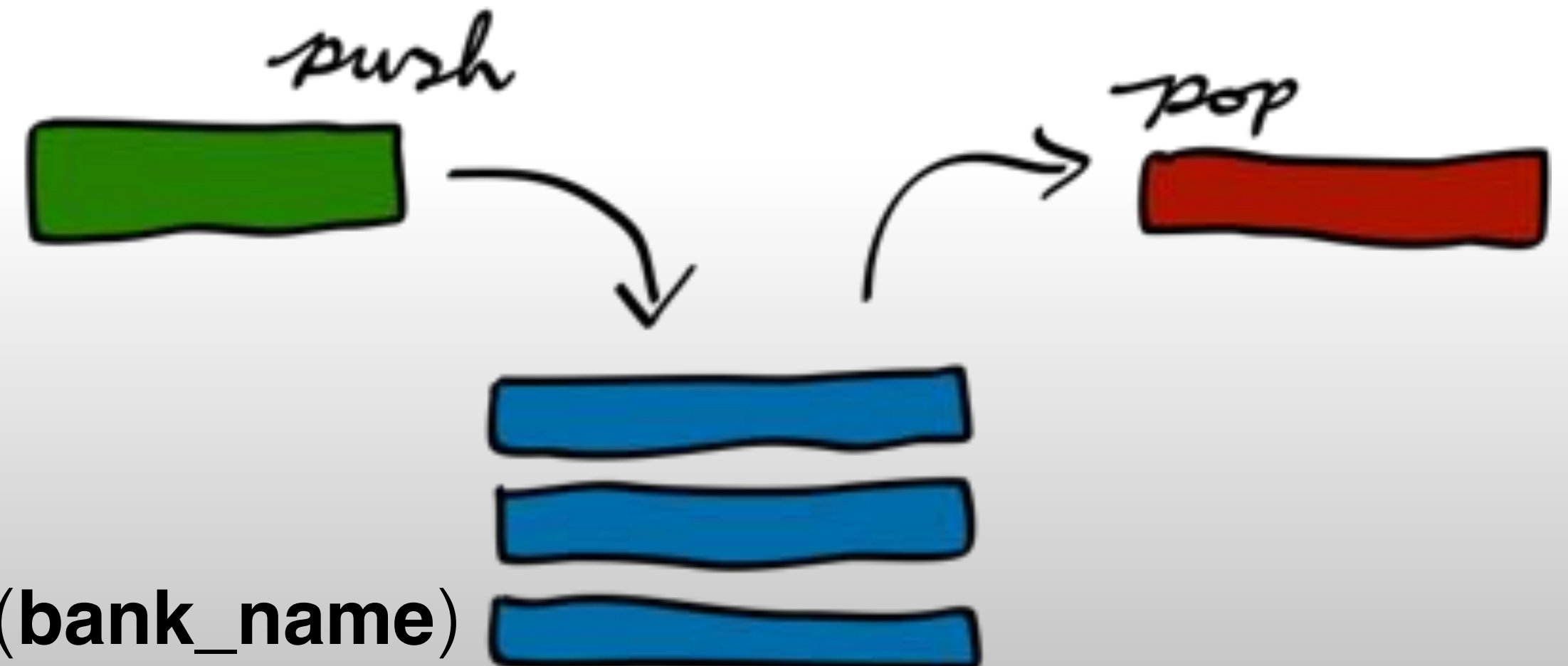
“Have I been paid?”

“What were the last three transactions”

“What is the balance of my **checking account** at **BofA**”

Intent: NoIntent ..

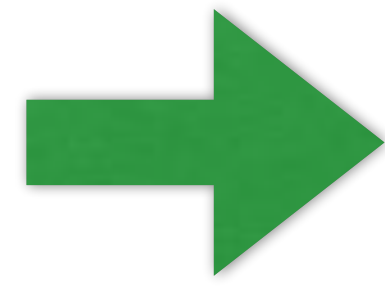
```
intent = stack.pop()  
stack.clear()
```



Intent: GetDeposit ()

Intent: GetTransactions (number)

Intent: GetAccountBalance (acct_type) (bank_name)



“No”

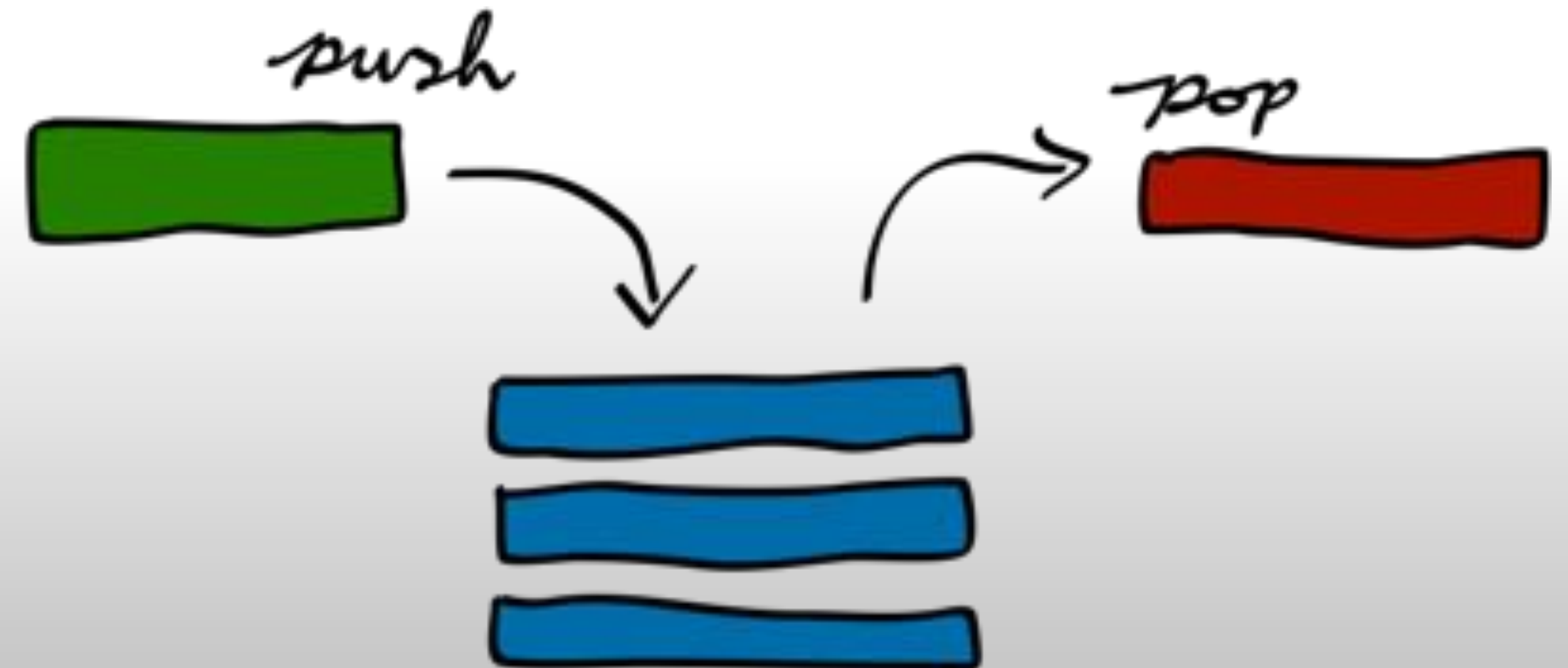
Mindy: “**Are we still talking about your checking account at**

“Have I been paid?”

“What were the last three transactions”

“What is the balance of my **checking account** at **BofA**”

Intent: `GetDeposit ()`





Shared Control / Having a Conversation

Volunteering information



User: **Alexa, talk to Mindy.**

Mindy: “Welcome back Wolf, your portfolio went up 2.7% today, good job!”

User: ***What’s the balance of my IRA***

Every response object may also include a **re-prompt**, which is only played, if the user remains silent after the response text was played.



User: **How am I doing in my coffee budget.**

Mindy: “So far you spent \$17 in the coffee-shop category and have a total amount of \$25 budgeted.”

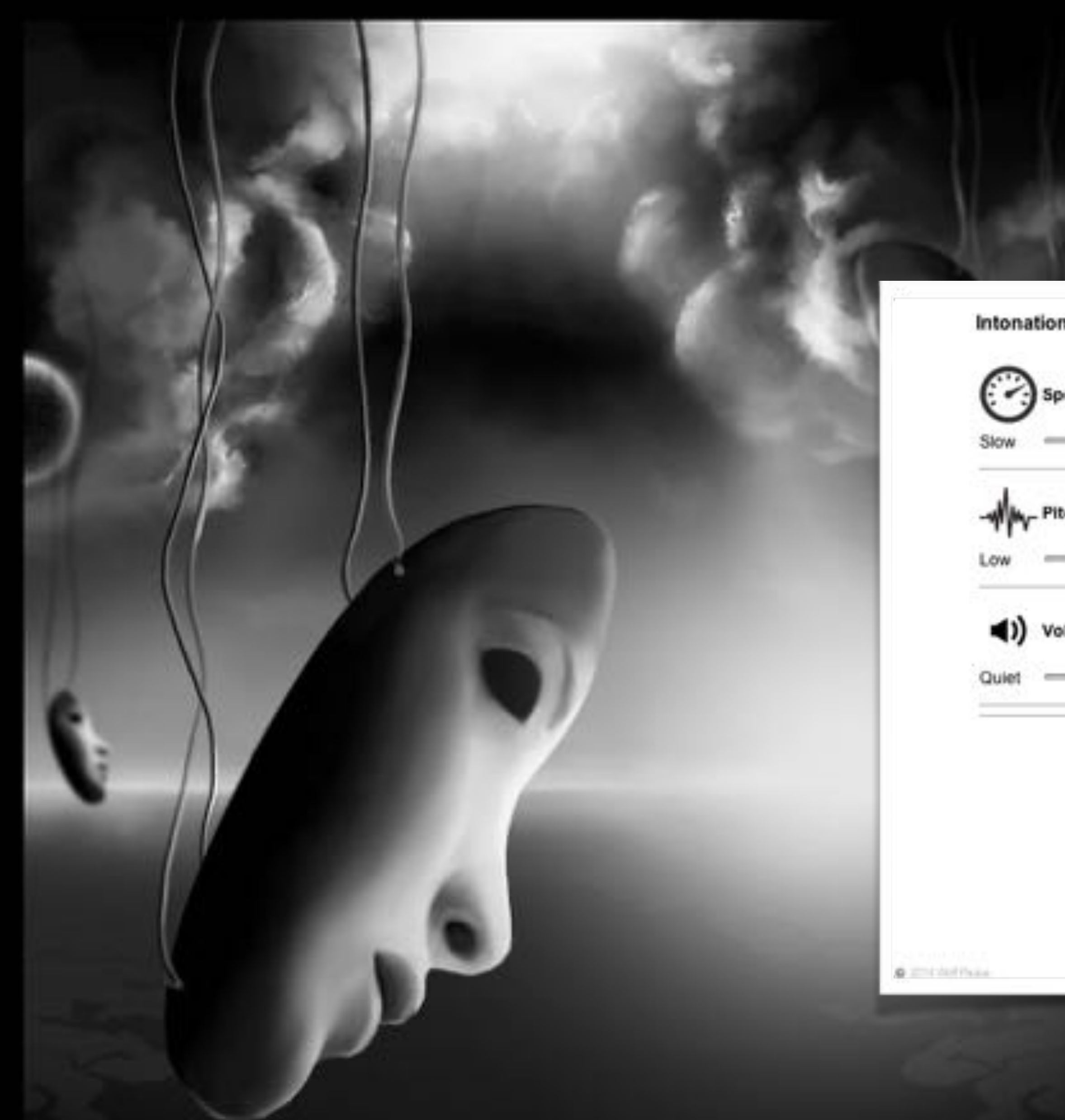
User: **<silence>**

Mindy: “**\$user**, would you like to know about your **\$parent_budget** as well?”

to be seen
point of view.

Empathy

understanding and
feelings, thought
of another. exper
what is thou



Intonation Attributes



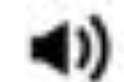
Speaking Rate (Beginning, End, Interpolation)

Slow Fast **060** | Slow Fast **040** | Ease in Ease out **010** |



Pitch Level (Beginning, End, Interpolation)

Low High **050** | Low High **040** | Ease in Ease out **000** |



Volume (Beginning, End, Interpolation)

Quiet Loud **050** | Quiet Loud **040** | Ease in Ease out **000** |

Interpolation Parameter: Ease In, Default, Ease Out

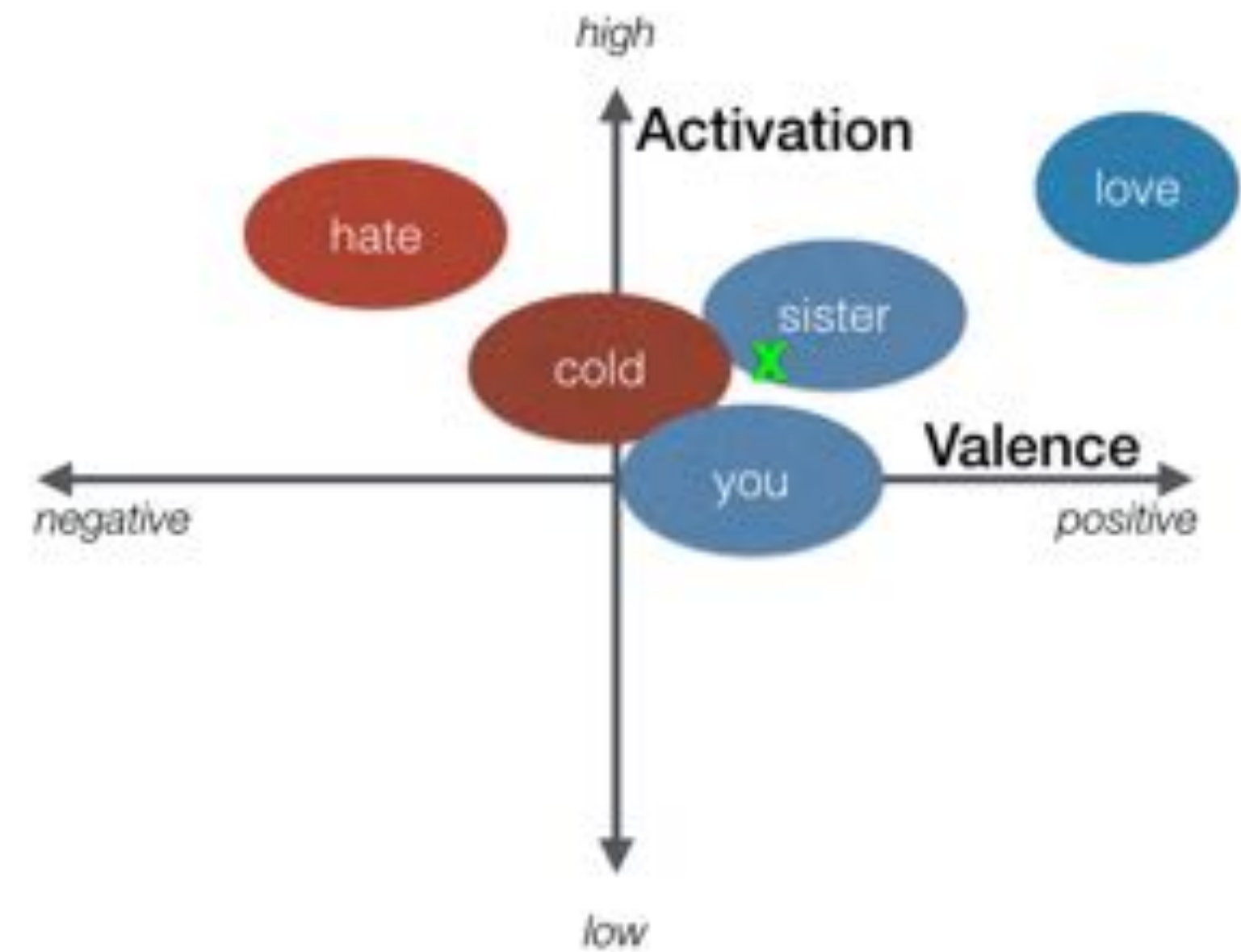


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I love you but hate your cold sister

- red is negative emotion
- blue is positive
- size indicates activation

```
...  
<word>  
  <token>love</token>  
  <emotion>  
    <measure type="DAL"  
      valence="3.0"  
      activation="2.6364"  
      imagery="1.4"/>  
  </emotion>  
</word>  
...
```



What are a good use cases?





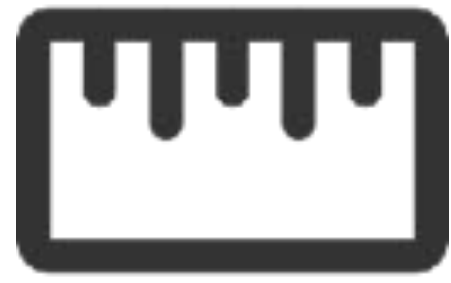
usage frequency

A voice or conversational user interface doesn't provide visual cues, user came to rely on, when using GUIs. I.e., infrequent use a CUI means users will **fail to remember and won't have efficient, productive interactions** and instead users will have to re-learn how to best communicate (feeling out boundaries, establishing trust, ..)

Therefore, use-cases that are performed frequently, ideally daily are favorable candidates.

Which product (or component of my product) gets used every day





dialogue length

For multiple reasons (including *number of entities, complexity, response time, error rate, etc.*) favorable use-cases require very little verbal input. At least for the near term, a possible rule of thumb could be:

number of words out > number of words in

Which query or task can a user perform, by speaking only a few words





execution

Favorable use-cases do more than answering questions or volunteering insights and advice, instead performing tangible tasks for the user, like augmenting, sending, ordering, etc., creating a sense of **accomplishment**.

What does a user accomplish, beyond listing to synthesized text





optimized for x

Favorable use-cases for a CUI are those that can be performed faster, or **more directly**, or more conveniently, or performed simultaneously with other tasks, .. when compared to a *"traditional"* execution.

Why would a user prefer a conversational user interface





coverage

To minimize frustration, almost **all reasonable questions** a user might ask, need to be answered.

This requirements makes a **single small domain** favorable (at least to initially learn and experiment, and to eventually expand from.)

Are there any reasonable questions that I cannot answer



Thanks for listening

