

LANGUAGE



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Natural Language
Classifier

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Personality Insights

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Retrieve and Rank

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Tone Analyzer

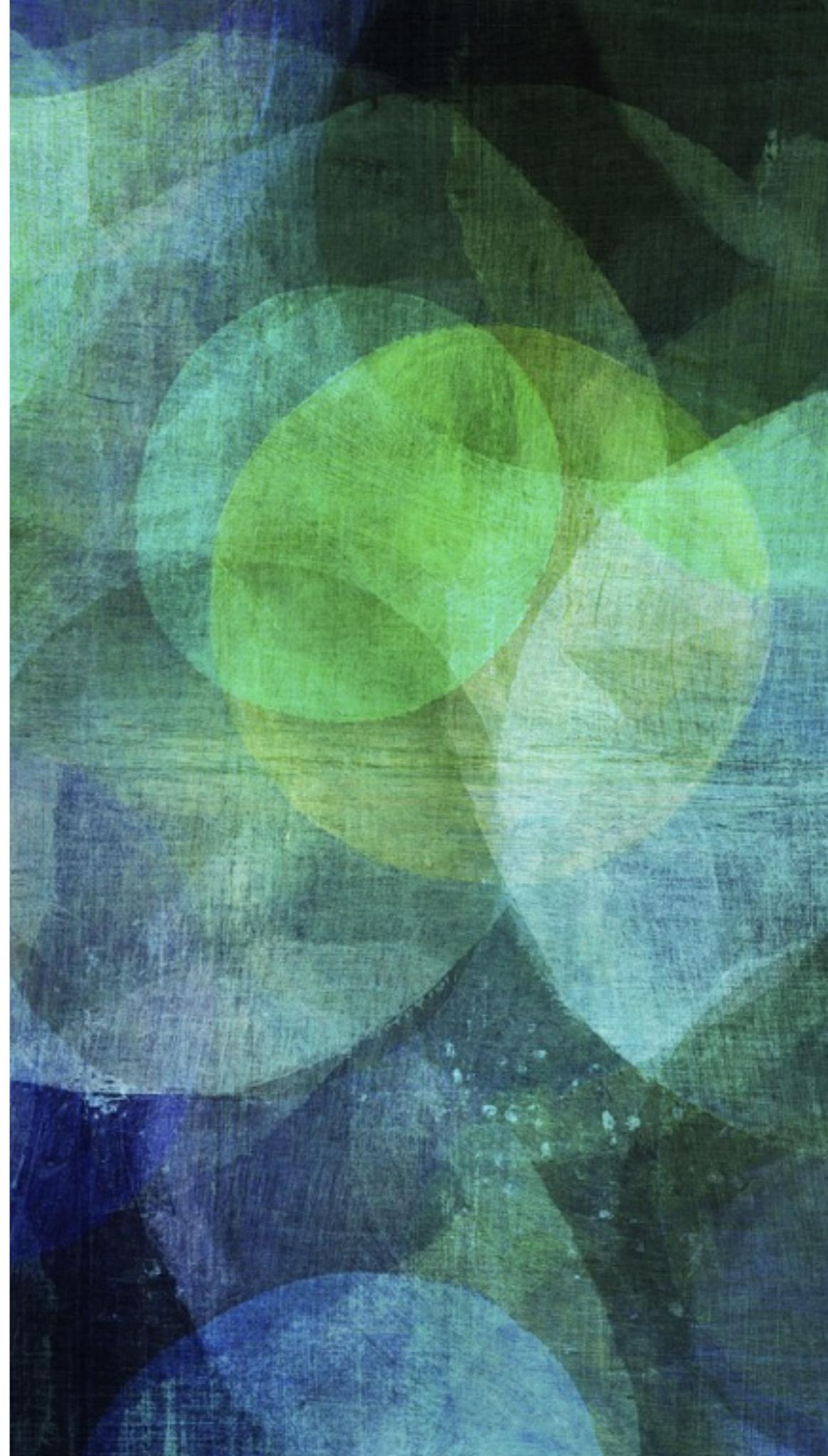
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*Watson Conversations
Watson Tone Analyzer
Watson Personality Insights*

Speaker: Vibha Sinha (vibha.sinha@us.ibm.com), IBM

Copyright: IBM, 2016

CONVERSATIONAL AGENTS



WHAT ARE CONVERSATIONAL AGENTS ?

“Non human” agents that can converse with humans in “Natural Language”

Did you have dinner yet?

Nah, not yet.

Oh dear. How do you feel about skipping meals?

Ok. Had a heavy lunch.

When humans don't give their bodies fuel every 3-6 hours, their blood sugar can drop, making them feel tired and cranky. Let's keep your spirits and your energy up today - remember to make time for a healthy snack soon!

Here is a good resource on healthy vs unhealthy food [Food and nutrition Guide](#).

Did you have lunch yet?

Yes, had rice and beans.

Nothing in your meal shows up on my list of unhealthy foods. How do you feel about what you ate?

Actually great ! The meal was very tasty !

I detected joy

Great job, keep at it!

THE IDEA OF SUCH AGENTS HAS BEEN AROUND FOR A LONG TIME ...

*Eliza – 1964 – MIT AI Labs
Joseph Weizenbaum*

The screenshot shows a window titled 'Eliza' with a menu bar: File, Edit, Options, Buffers, Tools, Help. Below the menu is a toolbar with various icons. The main area is a text-based conversation:

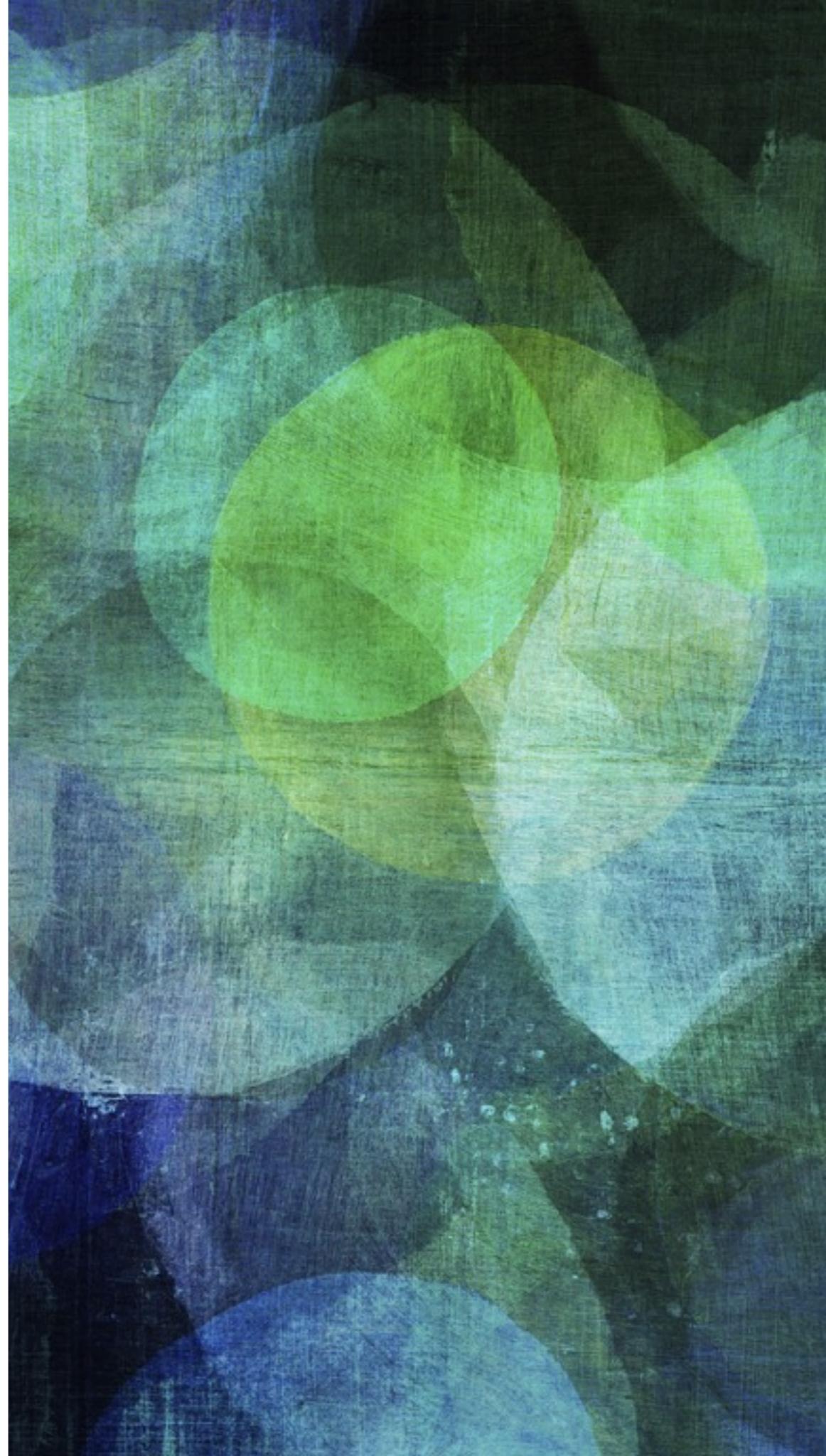
```
I am the psychotherapist. Please, describe your problems.  
Each time you are finished talking, type RET twice.  
I have a terrible headache.  
Maybe you should consult a doctor of medicine, I am a psychiatrist.  
Okay, I'll do that then.  
Can you elaborate on that?  
What are you talking about? No I cannot elaborate. See you later.  
Why do you say that?  
Now you're just talking nonsense!  
What makes you believe now I am just talking nonsense?  
You are not making any sense.  
Perhaps your plans have something to do with this.  
-u:** *doctor* (Doctor Fill)--L1--Top-----
```

*Bots Landscape Today: 170+ companies, \$4 billion in funding, thousands of bots. 2016 – VentureBeat**

FACTORS IMPACTING RISE OF CONVERSATIONAL AGENTS

- Business
 - Provide personalized interaction in user's medium of choice.
 - Automate traditional human-human conversations flows such as customer care
- Technological
 - Advances in natural language understanding
 - Advances in our understanding of conversations

WATSON CONVERSATION SERVICE



With the IBM Watson™ Conversation service you can create virtual agents and bots that combine machine learning, natural language understanding, and integrated dialog tools to provide automated customer engagements.

Watson Conversation provides an easy-to-use graphical environment to create natural conversation flows between your apps and your users.

UNDERSTAND THE CUSTOMER'S INTENT

- Leverages state of the art Deep Learning techniques to derive intent
- Watson has read Wikipedia enabling it to understand language and concepts
- Learns over time based on usage
- Handcrafted rules unable to scale and do not benefit from data

I forgot my password...
How do I get a new password?
Can't login into your site...
My login isn't working, please help...
Can you reset my password?

Intent = Password Reset

EXTRACT OTHER KEY INFORMATION

“I’m frustrated, I haven’t been able to login into your online billing system.”

Intent Password Reset

Entities Online Billing System

Context Bill Smith, 47, Gold Member, High Value

Context Mobile

TAKE ACTION – RESPONSES COME IN DIFFERENT FORMS

Question

How do I reset my password?



Answer

Guide the user through a set of steps

Someone has stolen my credit card.



Transfer to human agent

Where is the nearest store?



Application launches map with directions

I need to pay my outstanding invoice.



Bring user to pay bill screen

Can I pay my bills using my credit card?



Bring back an answer

Create new



3 intents

Sort by: Newest

5

#help

help

33

#no

did not have it

27

#yes

I ate

Try it out

⟳ Clear

Did you have yet?

Yes. Had rice and beans.

#yes

@food:rice

@food:beans

Nothing in your meal shows up on my list of unhealthy foods. How do you feel about what you ate?

Enter something to test your bot

IMPROVING CONVERSATIONS OVER TIME

Highlight a word from the utterance below to add as an entity value

roti

Select an entity or entity:value below to add "roti" as a value or synonym.

Intent classification

#yes

Save Cancel



System classification

#yes



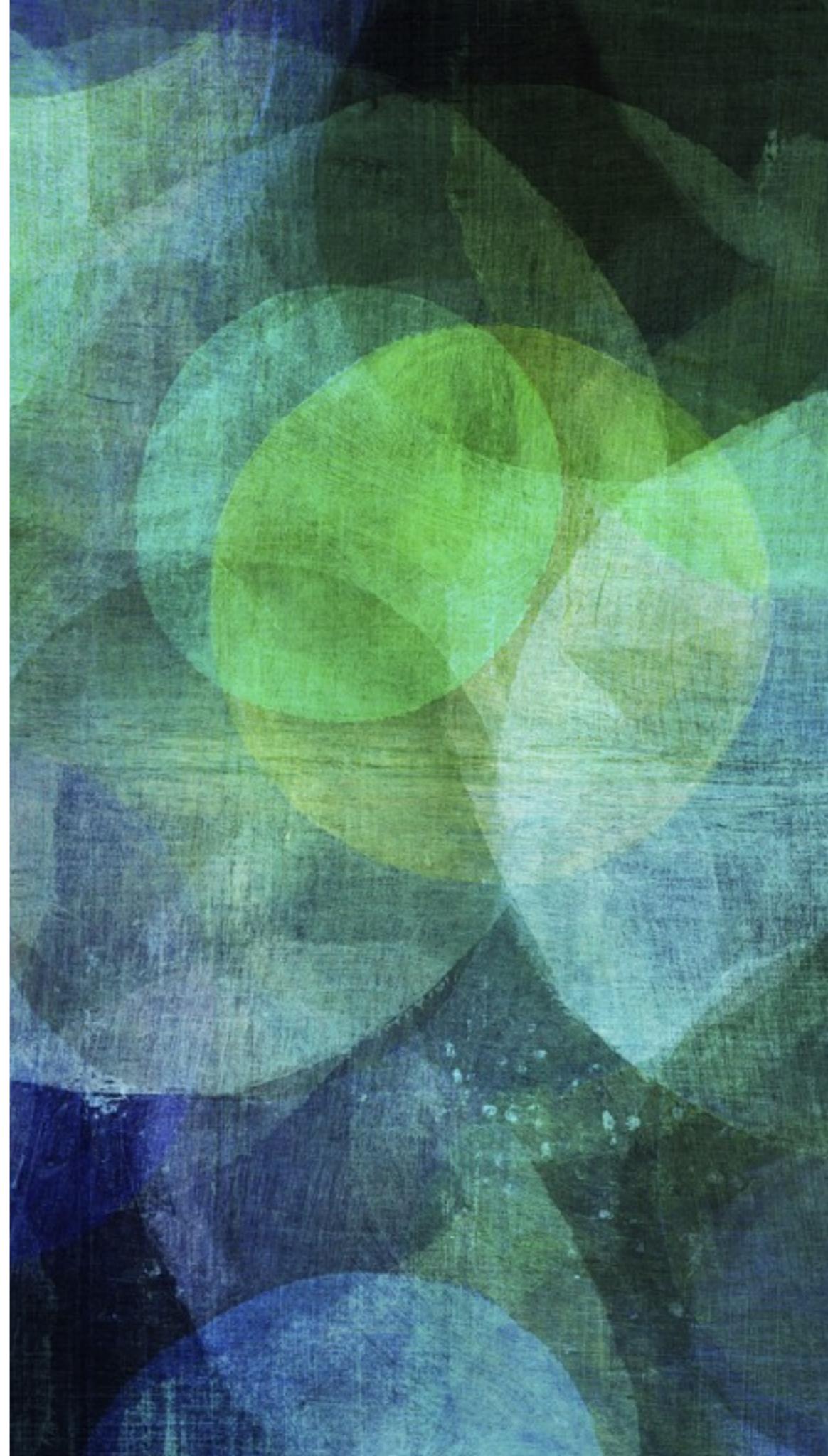
Entity values

- @
Cancel
- @food
- @food:7-up
- @food:7-ups
- @food:abalone
- @food:abalones

Can you tell me about what you ate today?

View conversation

NATURAL CONVERSATIONS



Natural Language

Yikes ! Internet not working again !



Content

Internet not working



Expression

Sadness

EXAMPLES OF NATURAL CONVERSATIONS



Please help get my ETF payment handled.
I'm really tired of talking to your consumer
affairs folks.

You came to the right place! Please DM the
phone tied to the account to better assist.
So glad you reached out !



Human agent understands the sadness of user and tries to reassure.

EXAMPLES OF NATURAL CONVERSATIONS



Can anyone explain this *** ? <http://.....>

It could be because of what is available to you in your package. You can view your account here.



Then why send me the damn message ! Or add me to package first !!!!

My apologies for the frustration. We would be happy to review your account & advise if 4K TV is included with your service



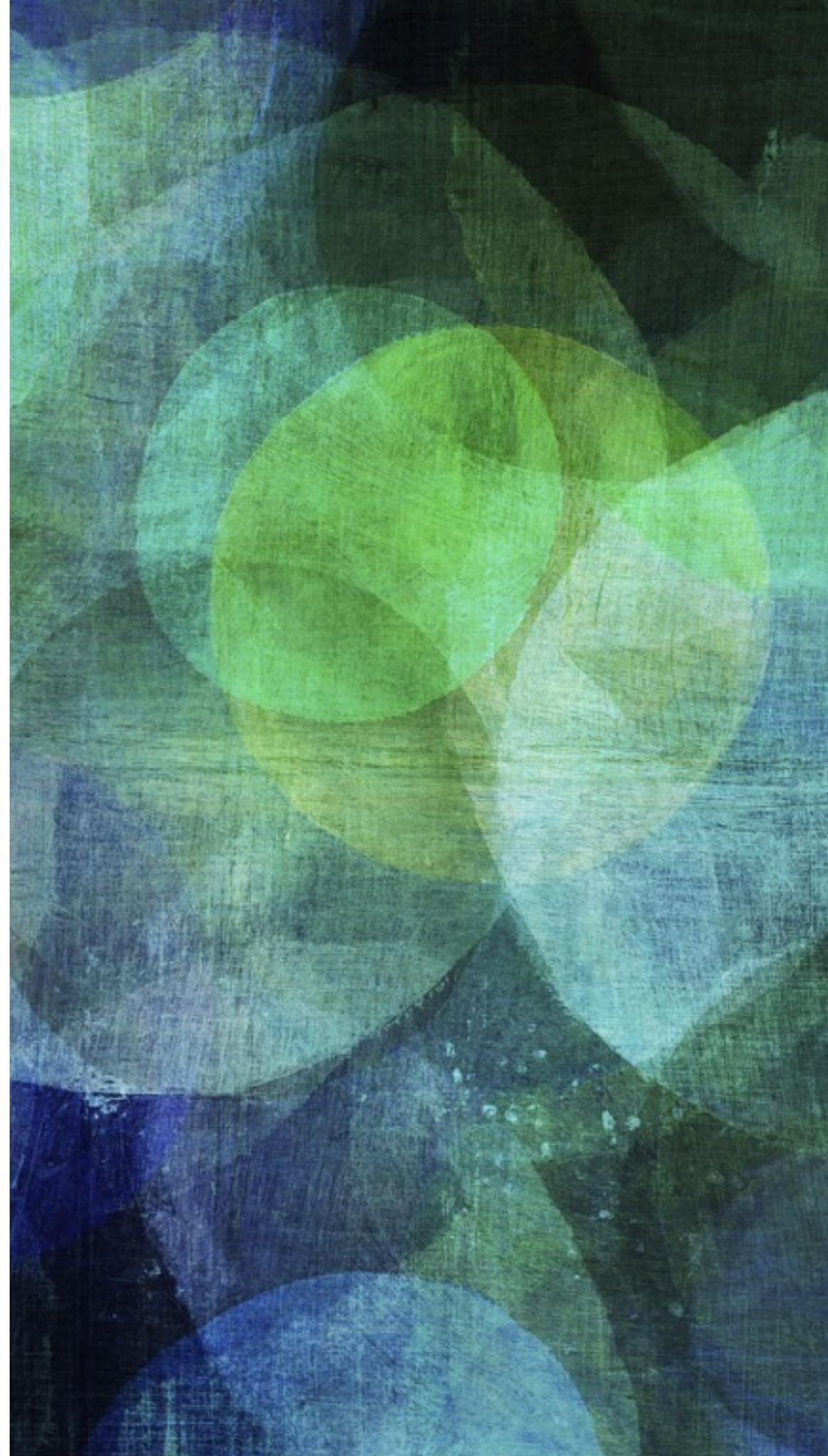
Human agent understands the rising anger and then apologizes

“

Even when users know they are talking to automated agents, they expect human-like responses

- *Nass, C., Moon, Y.: Machines and Mindlessness: Social Responses to Computers. Journal of Social Issues 56(1), 81-103 (2000)*
- *Nicole C. Krämer, Social Effects of Virtual Assistants. A Review of Empirical Results with Regard to Communication, Proceedings of the 8th international conference on Intelligent Virtual Agents, September 01-03, 2008, Tokyo, Japan*

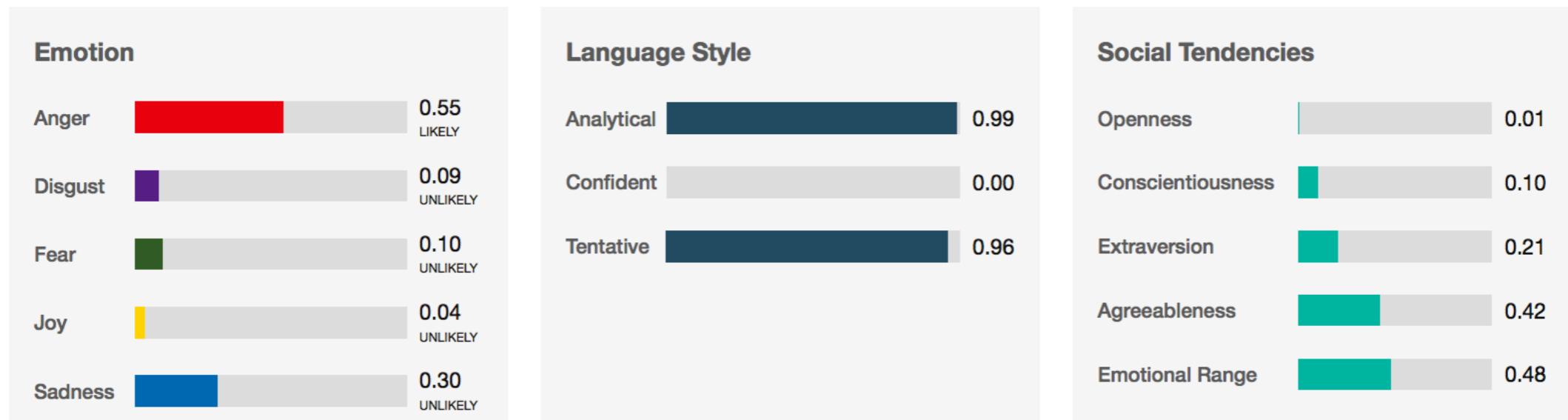
WATSON TONE ANALYZER



The IBM Watson™ Tone Analyzer Service uses linguistic analysis to detect three types of tones from written text: emotions, social tendencies, and writing style. Emotions identified include things like anger, fear, joy, sadness, and disgust. Identified social tendencies include things from the Big Five personality traits used by some psychologists. These include openness, conscientiousness, extraversion, agreeableness, and emotional range. Identified writing styles include confident, analytical, and tentative.

TONE ANALYZER - EXAMPLE

And yet again ! Cannot connect to billing system. Might have forgotten my password.



- Hmm .. I am not sure if this is correct. I have been trying to reset my password for so long now, and it is not working.

User is sounding “tentative” and “angry”.

- This device was a fun way to connect my Pandora and other music choices together as well as get on the spot news/weather reports. But it stopped functioning 2 weeks over the warranty and YYY said too bad. Oh well I will definitely not be buying another.

User is sounding “sad”, “agreeable”, and “confident”.

Natural Language



Content

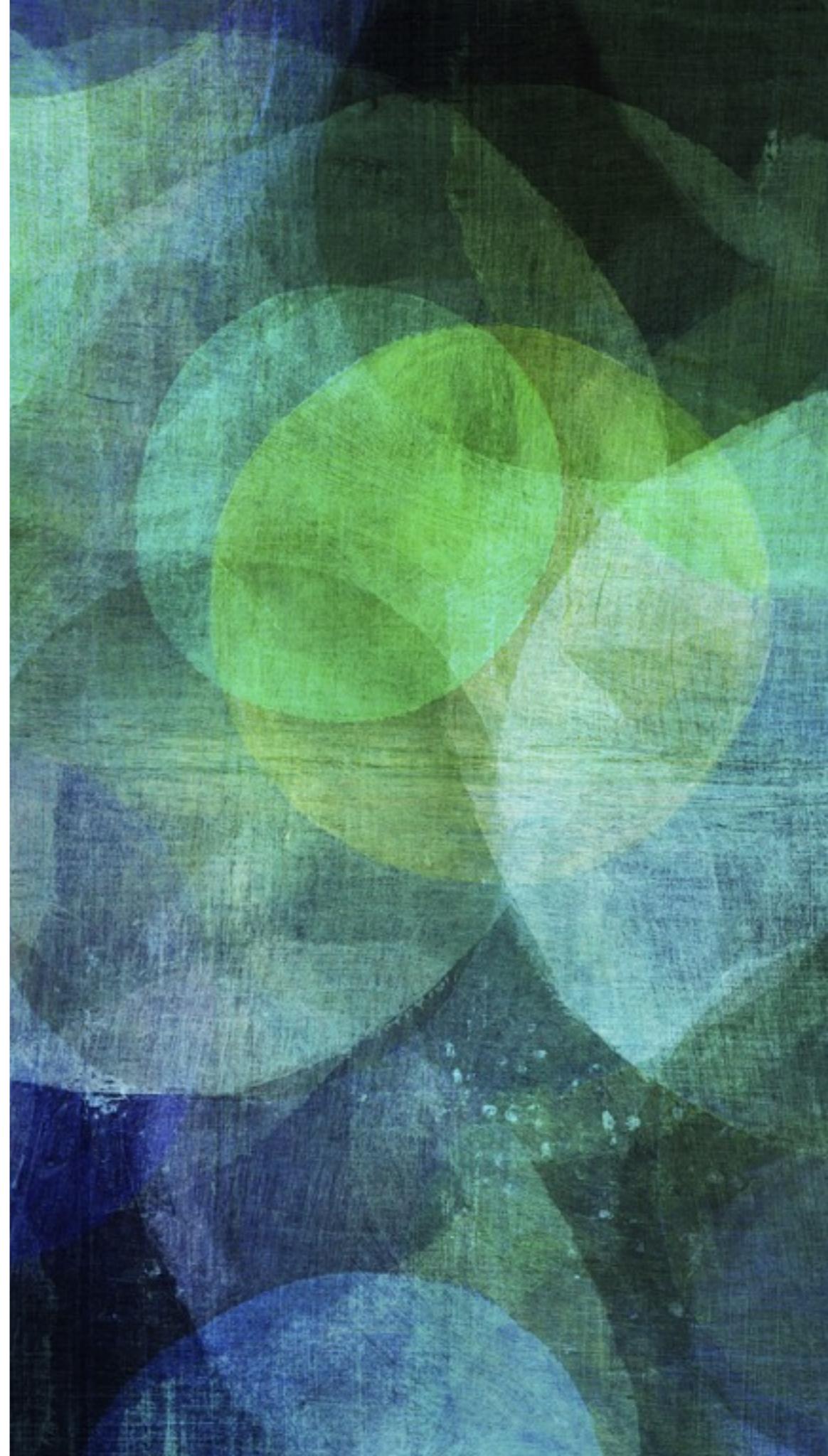
*Watson
Conversation*



Expression

*Watson Tone
Analyzer*

CONVERSATIONS AUGMENTED WITH TONE DETECTION



Did you have dinner yet?

yes

Intent

Can you tell me about what you ate today?

I had a bacon sandwich

Entity

Hmm...bacon. How do you feel about what you ate?

Wonderful ! I am sooo satisfied.

Tone

I detected joy

🏃 Hey now, that was a big splurge! Make sure to reduce or burn more calories to offset times you spoil yourself!

Here is a good resource on healthy vs unhealthy food [Food and nutrition Guide](#).

Did you have dinner yet?

yes. Had bacon sandwich.

Intent and entity

Hmm...bacon. How do you feel about what you ate?

Kind of feel guilty about indulging myself.

Tone

| *I detected sadness*

 Don't worry, indulging from time to time is okay – especially if it brings you joy! It's only a problem when we make a habit of it. Don't let it put you off track for the rest of the day!

Did you have dinner yet?

yes

Can you tell me about what you ate today?

bacon sandwich

Hmm...bacon. How do you feel about what you ate?

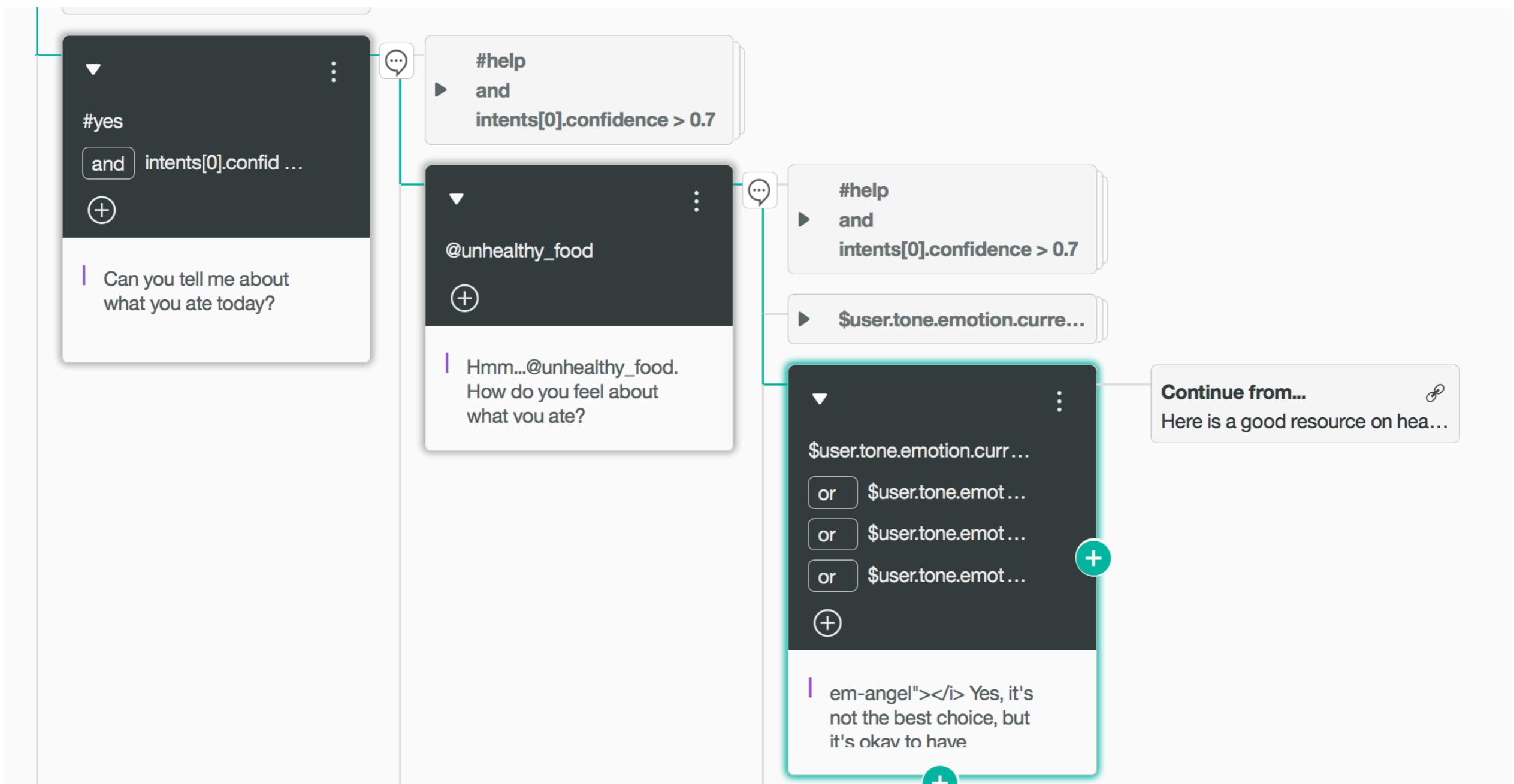
wonderful !!!

I detected joy

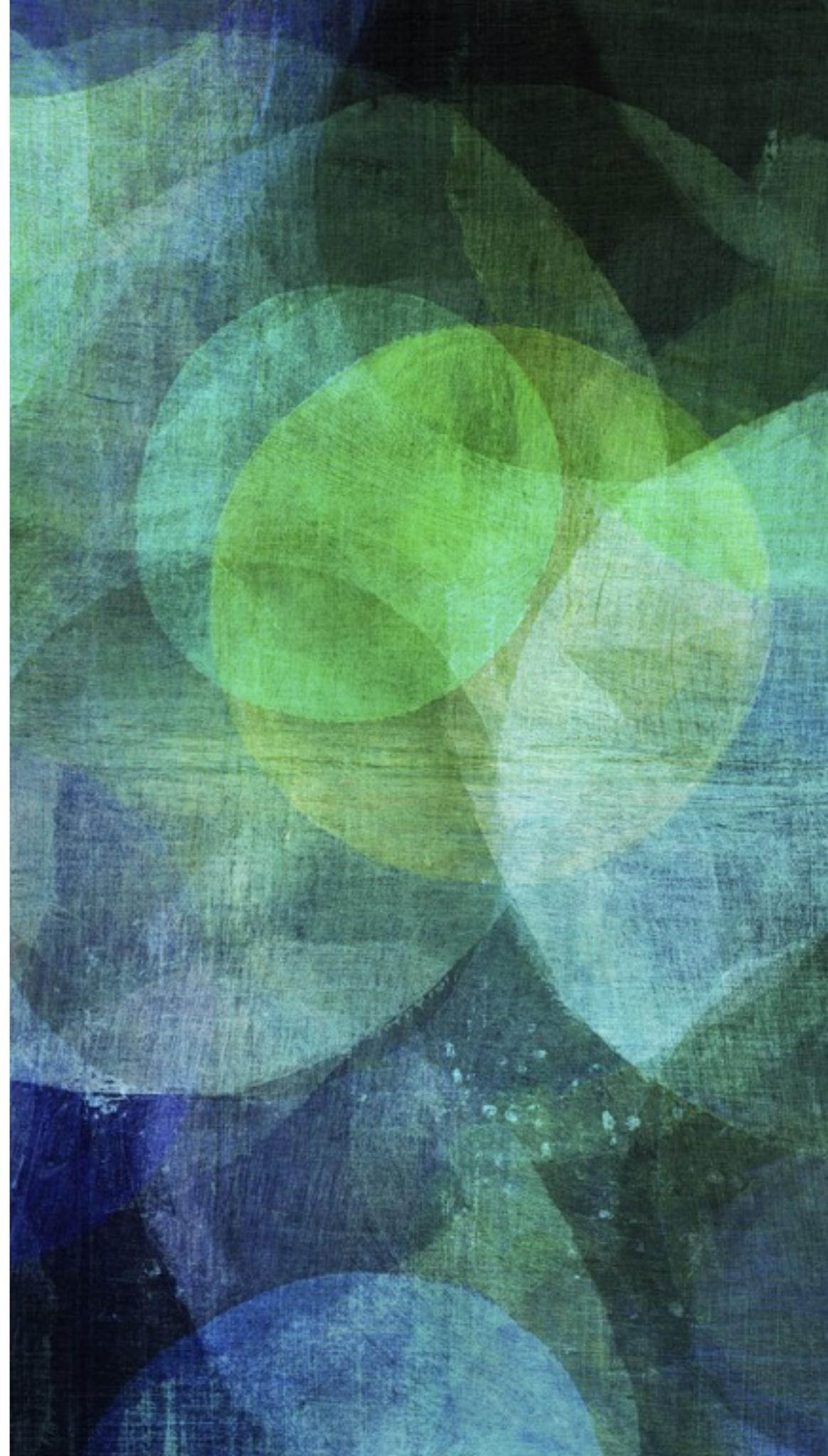
🏃 Hey now, that was a big splurge! Make sure to reduce or burn more calories to offset times you spoil yourself!

Here is a good resource on healthy vs unhealthy food [Food and nutrition Guide.](#)

```
22  },
23 "context": {
24   "time": "dinner",
25   "user": {
26     "tone": {
27       "emotion": {
28         "current": "joy"
29       },
30       "language": {
31         "current": []
32     },
33       "social": {
34         "current": [
35           "openness_low",
36           "conscientiousness_low",
37           "emotional_range_low"
38         ]
39       }
40     }
41   },
```



PERSONALIZATION

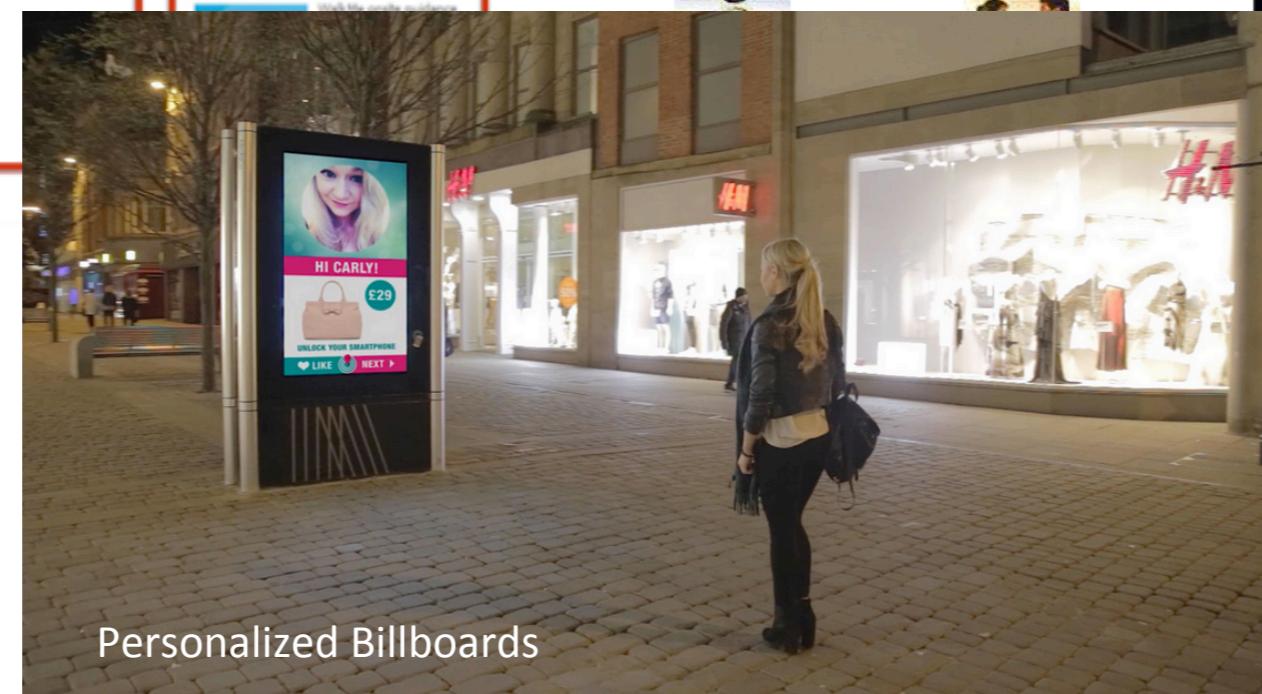


We are living in a world of Hyper Personalization

The use of data to provide more personalized and targeted products, services, and content.

A screenshot of a Facebook news feed. On the left, there's a sidebar with various links like 'Welcome', 'News Feed', 'Messages', etc. The main area shows a post from 'Wix' with the title 'Create Your Own Website. It's Easier than Ever!' and a preview of a website design. To the right of this post is a sponsored ad for 'Natural Relief Slippers' with a small image of a person wearing slippers. Below these are other news items and links.

Personalized ads and news feed

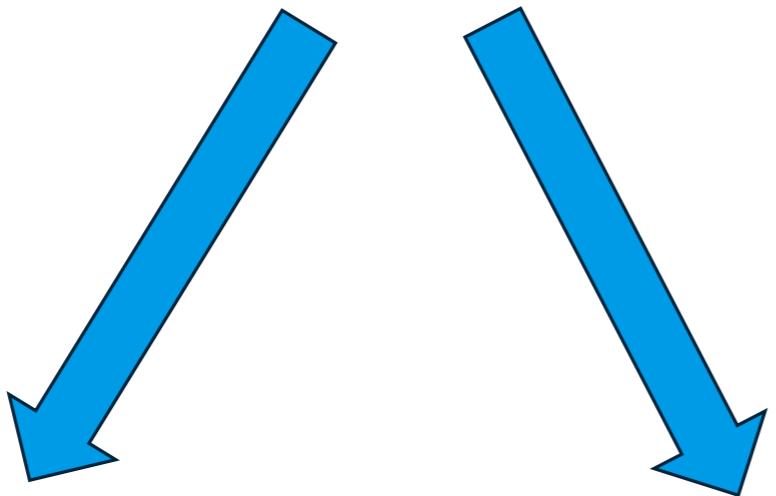


Personalized Billboards

A screenshot of a movie recommendation interface. At the top, it says 'Other Movies You Might Enjoy'. Below this are several movie cards with titles like 'Amelie', 'Y Tu Mama Tambien', 'Guys and Balls', 'Mostly Martha', 'Only Human', and 'Russian Dolls'. Each card includes a small movie poster, an 'Add' button, and a rating scale from one to five stars. A message box on the right says 'Eiken has been added to your Queue at position 2.' and 'This movie is available now.' with a 'Move To Top Of My Queue' button. At the bottom, there are sections for 'You've Viewed' and 'Customers who viewed this also viewed'.

CONVERSATION PERSONALIZATION

Message: Get 5% off



Because you are our valued customer, get 5% off on this booking

Discover the French culture and traditions, 5% off on your Paris tickets

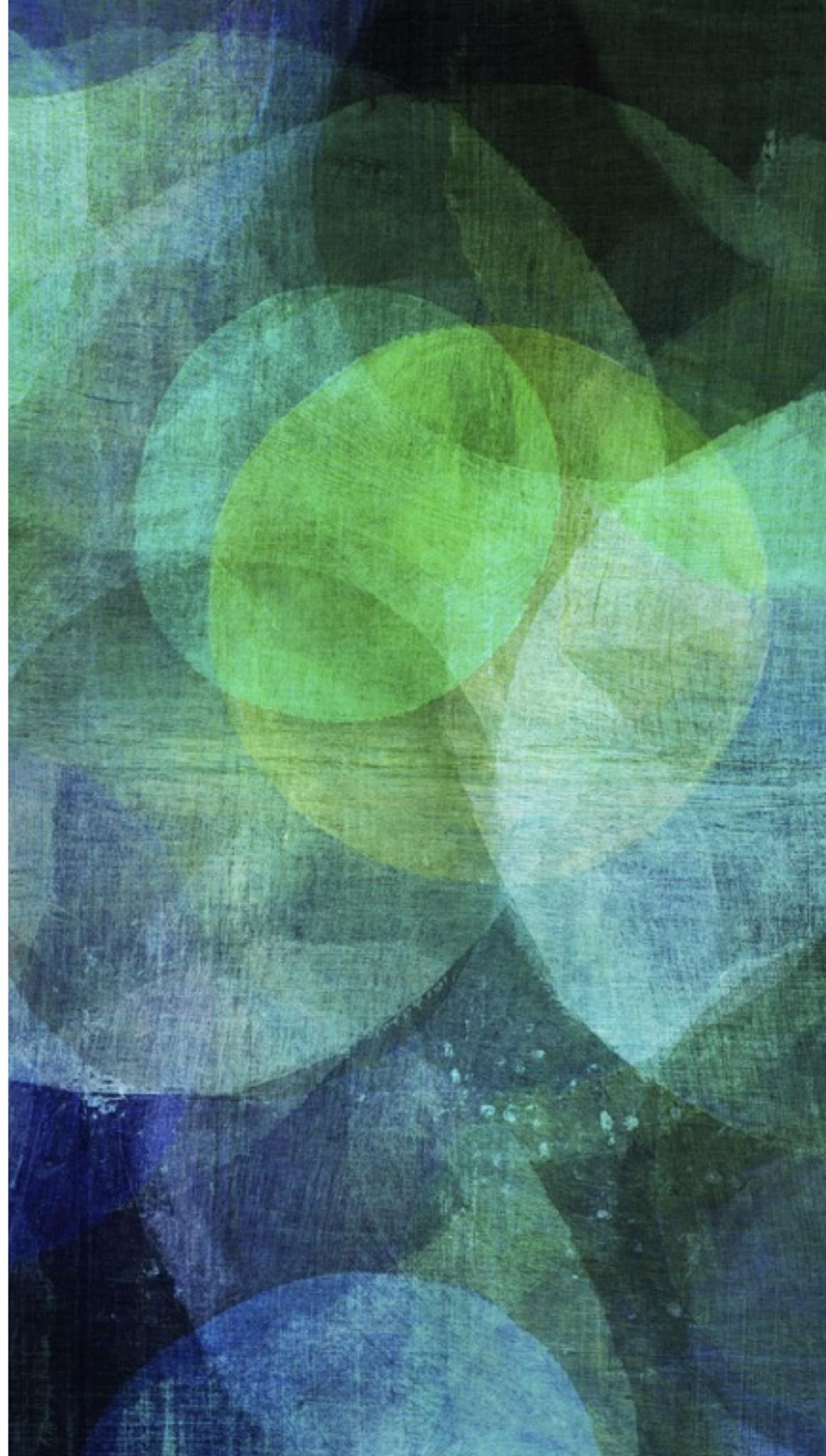


Understand user and generate personalized responses

Contextual Data:

- Demographics
- Historic Interactions
- Location
- Current situation
- Personality

WATSON PERSONALITY INSIGHTS

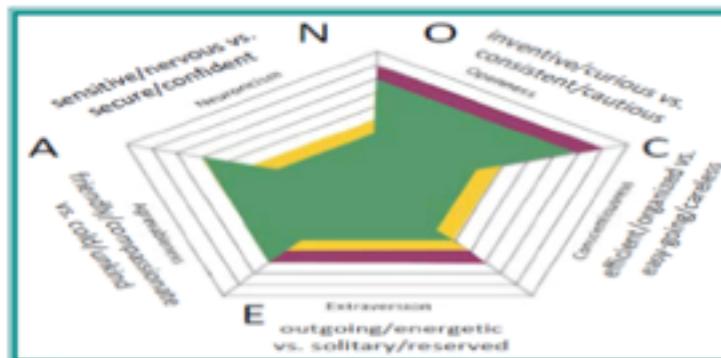


WATSON PERSONALITY INSIGHTS

- Given text written by an individual, infers his/her personality along well known psychological dimensions.

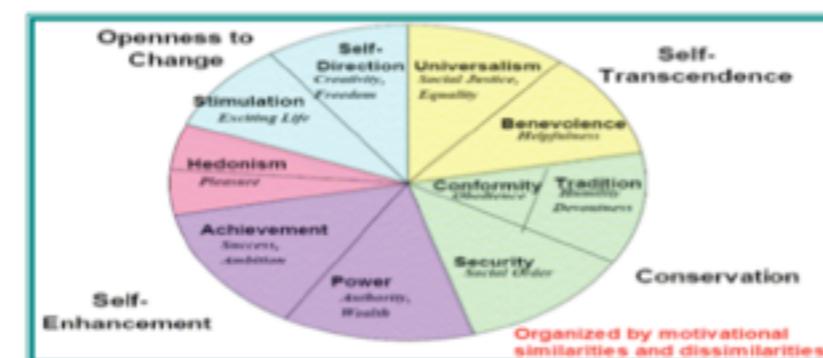
Discovering Characteristics

How an individual will engage with the world: *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* (also known as *Emotional Range*). Model by Costa and Norman



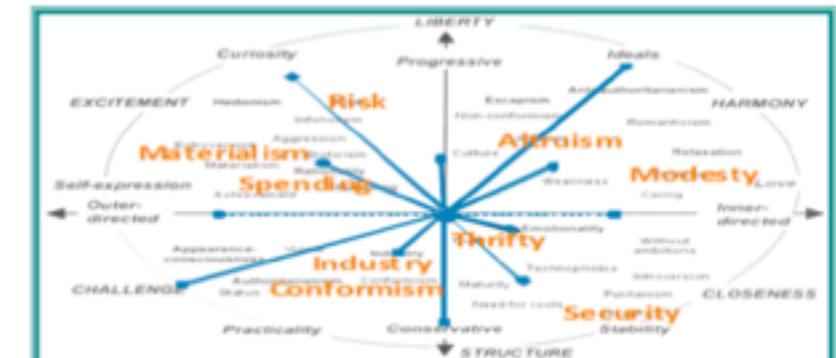
Basic Human Values

Schwartz's work in psychology. These describe motivating factors which influence a person's decision-making across five dimensions



Fundamental Human Needs

Aspects of products that will resonate with an individual across twelve needs. Kotler's and Ford's work in marketing



<https://www.ibm.com/watson/developercloud/doc/personality-insights/models.shtml>

Self-transcendence / Helping others, Conservation / Tradition, Hedonism / Taking pleasure in life, Self-enhancement / Achieving success, and Open to change / Excitement.

Excitement, Harmony, Curiosity, Ideal, Closeness, Self-expression, Liberty, Love, Practicality, Stability, Challenge, and Structure.

BASIC PREMISE: PERSONALITY IN TEXT

- How you write, has signals on kind of person you are.



- Personality influences preferences and behavior.

Responding to tweets (information collection)	2000 Twitter users	More likely to respond: Score high on Big Five dimensions and facets excitement-seeking, friendliness, activity level, gregariousness, trust, morality, extraversion, and agreeableness Less likely to respond: Score high on Big Five facets cautiousness and anxiety
Environmental consciousness	Environmental concerns	Personality influences people's level of interest in environmental concerns and pro-environmental behavior.
Taking risks	Agreeableness and conscientiousness lower people's willingness to take risks, while extraversion increases it.	Copyright: IBM, 2016

WATSON PERSONALITY INSIGHTS

- Based on personality, gives likely/unlikely user preferences.
 - Shopping preferences e.g. ownership, safety, quality, style, resale value, comfort etc.
 - Movie, music and reading preferences e.g romance, adventure, fiction etc.
 - Health and activity preferences e.g adventurous, outdoor etc.



@Oprah (EN)

High on Agreeableness, Conscientiousness, Openness
Needs Harmony, Curiosity, Self Expression. But low on Practicality
Values Tradition, Helping Others and Stimulation

Summary

You are helpful and analytical.

You are emotionally aware: you are aware of your feelings and how to express them. You are empathetic: you feel what others feel and are compassionate towards them. And you are altruistic: you feel fulfilled when helping others, and will go out of your way to do so.

Your choices are driven by a desire for well-being.

You consider both tradition and independence to guide a large part of what you do. You highly respect the groups you belong to and follow their guidance. And you like to set your own goals to decide how to best achieve them.

[How did we get this?](#)

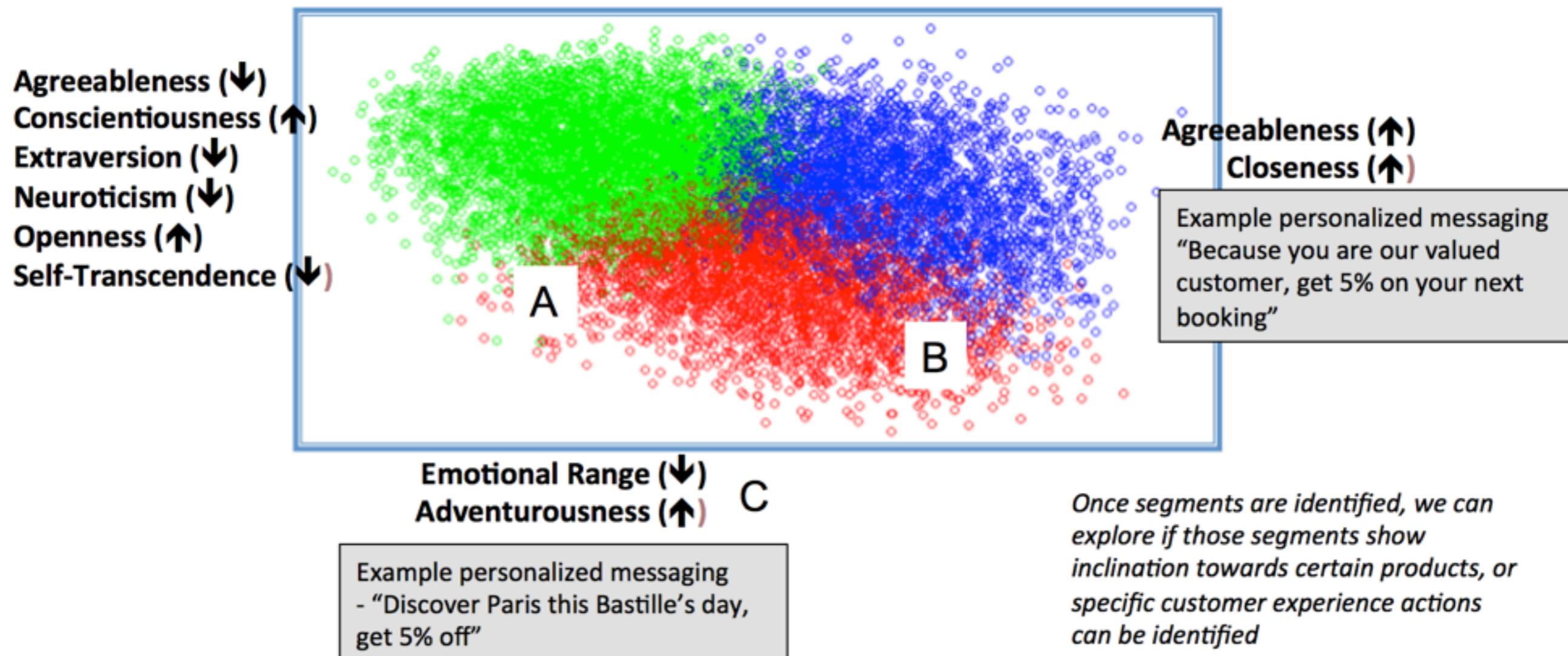
You are likely to_____

- prefer resale value when buying automobiles
- prefer style when buying clothes
- be influenced by online ads when making product purchases

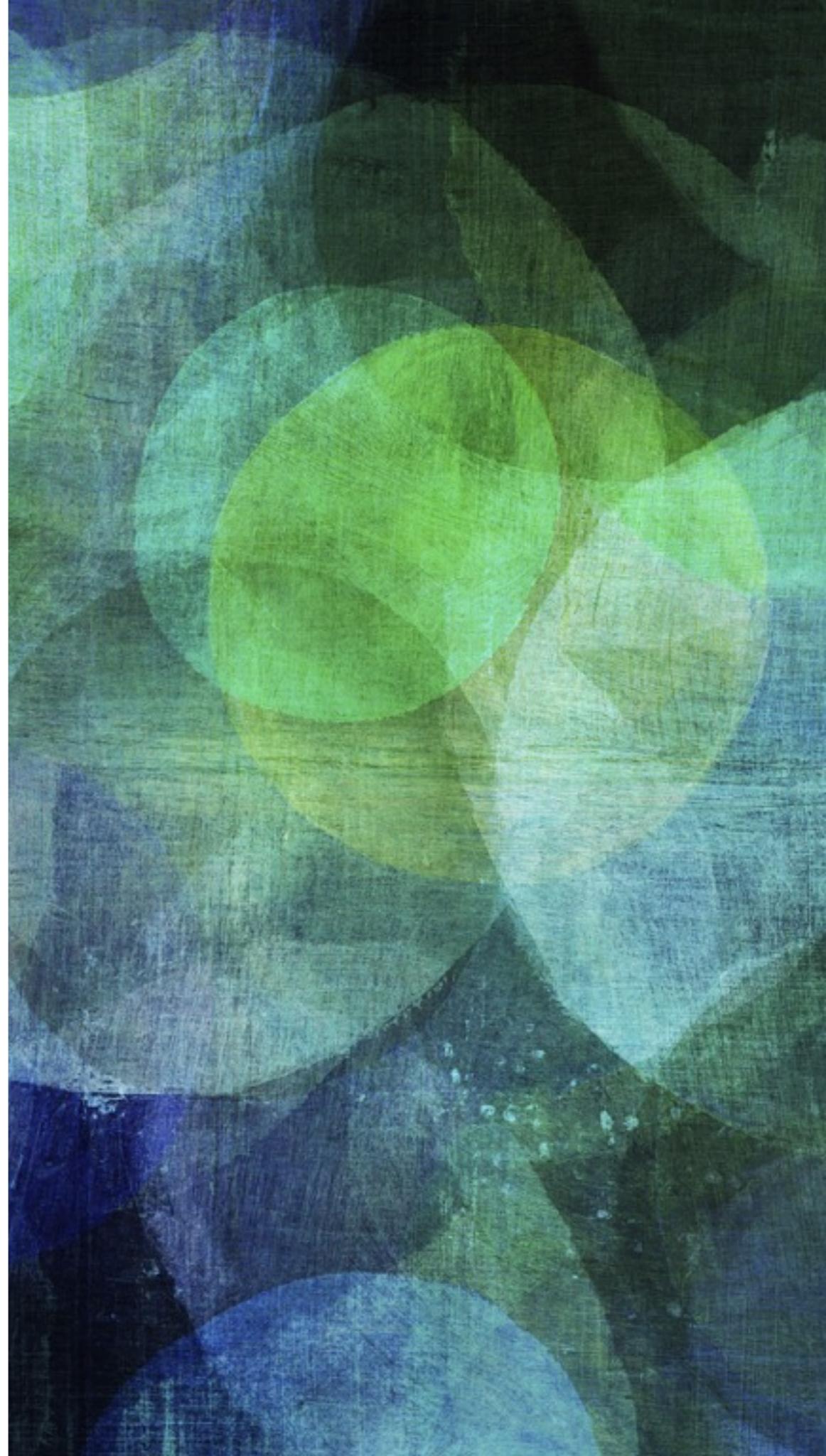
You are unlikely to_____

- be sensitive to ownership cost when buying automobiles
- prefer quality when buying clothes
- prefer comfort when buying clothes

CUSTOMER SEGMENTATION BASED ON PERSONALITY



CONVERSATIONS AUGMENTED WITH PERSONALITY INSIGHTS



PERSONALITY AND FOOD HABITS

- Shepherd and Sparks (1994) developed the relationship between personality and food choice. Their study reveals that people with high scores in emotional range (neuroticism), especially in the facet immoderation, tend to consume high-fat food.
- Elfhag and Morey (2008) revealed that conscientiousness is positively related to a preference for low-fat food. Specifically, the self-discipline and dutifulness facets of the conscientiousness dimension positively influence the consumption of low-fat food and (because weight management is closely related to food choice) regular weight control.

USER LIKELY TO INDULGE IN UNHEALTHY EATING

Please enter your twitter handle (e.g.,) for a more personalized experience. If you prefer not to share your twitter handle, please respond with 'no'.

@justinbieber

Thank you for providing your twitter handle, @justinbieber. We have been able to infer your eating preferences.

Did you have dinner yet?

yes

Can you tell me about what you ate today?

bacon sandwich

Hmm...bacon. How do you feel about what you ate?

pretty good

I detected joy

🏃 Hey now, that was a big splurge! Make sure to reduce or burn more calories to offset times you spoil yourself!

Here is a good resource on healthy vs unhealthy food [Food and nutrition Guide](#).

```
32     "current": [
33         "tentative_high"
34     ],
35 },
36     "social": {
37         "current": [
38             "openness_low",
39             "conscientiousness_low",
40             "emotional_range_low"
41         ]
42     },
43 },
44     "personality": {
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49         "self_discipline": 0.26437969049351046,
50         "likely_to_eat_unhealthy": "true",
51         "likely_to_eat_healthy": null
52     },
53     "twitter_handle": "@justinbieber"
54 },
55     "conversation_id": "ffb363d0-6d65-4f6a-8526-6cde4dee73aa",
56     "system": {
57         "dialog_stack": [
58             "root"
59         ],
60         "dialog_turn_counter": 5,
```

USER LIKELY TO HAVE HEALTHY EATING HABITS

Please enter your twitter handle (e.g.,) for a more personalized experience. If you prefer not to share your twitter handle, please respond with 'no'.

@adele

Thank you for providing your twitter handle, @adele. We have been able to infer your eating preferences.

Did you have dinner yet?

yes

Can you tell me about what you ate today?

Had a bacon sandwich

Hmm...bacon. How do you feel about what you ate?

pretty good :)

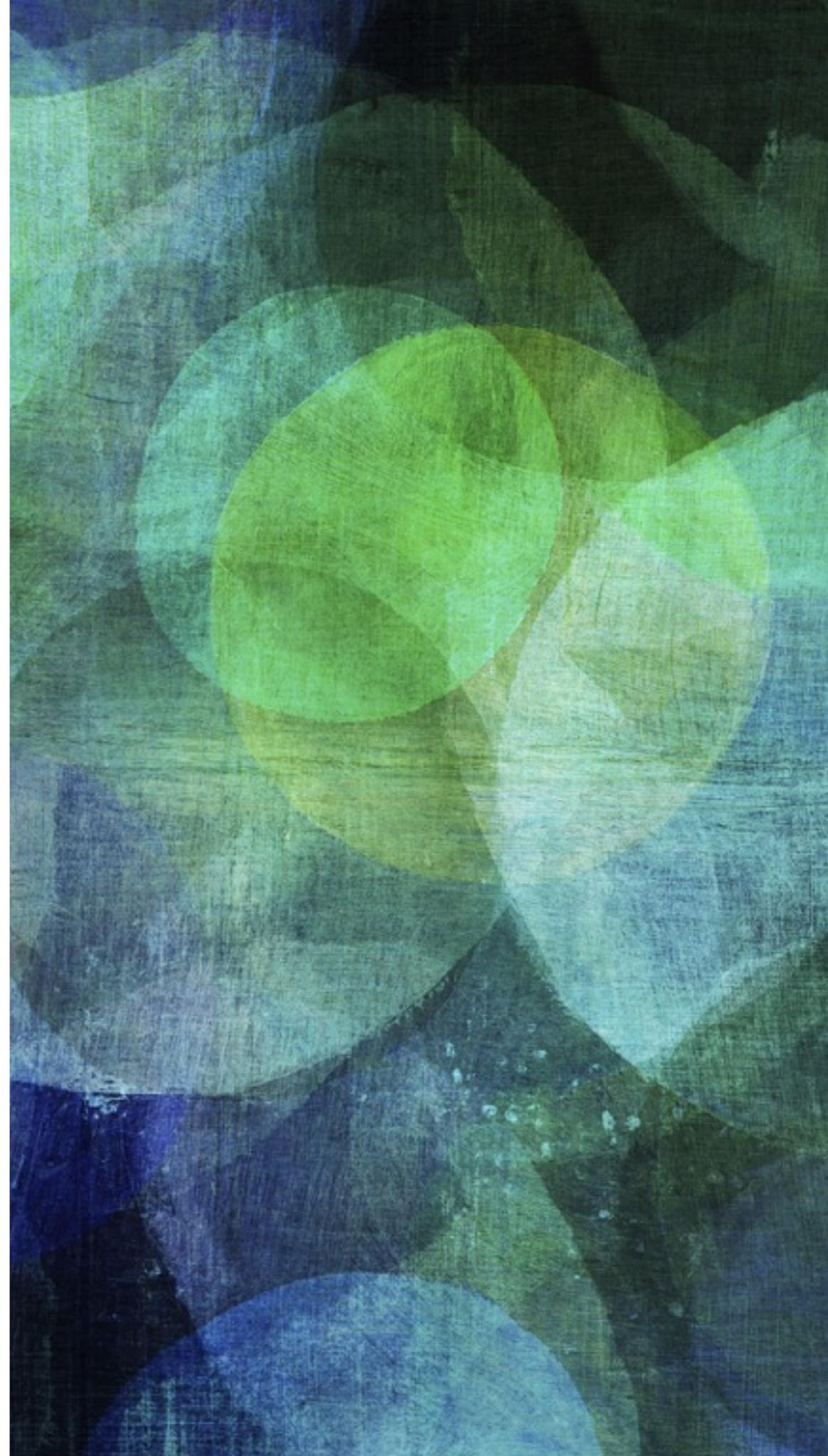
I detected joy

🎉 Hope you enjoyed the treat! Sometimes it's better to cure cravings with a taste of what you want. Good health and happiness is all about balance and moderation.

Here is a good resource on healthy vs unhealthy food [Food and nutrition Guide](#).

```
26     "user": {
27         "tone": {
28             "emotion": {
29                 "current": "joy"
30             },
31             "language": {
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35             },
36             "social": {
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38                     "openness_low",
39                     "conscientiousness_low",
40                     "emotional_range_low"
41                 ]
42             }
43         },
44         "personality": {
45             "conscientiousness": 0.5357756136934353,
46             "immoderation": 0.5567901310507413,
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48             "neuroticism": 0.372444885971305,
49             "self_discipline": 0.7733999645352176,
50             "likely_to_eat_unhealthy": null,
51             "likely_to_eat_healthy": "true"
52         },
53         "twitter_handle": "@adele"
54     },
55     "conversation_id": "2edd6427-429a-49cb-9925-bbea55f3c025",
56     "system": {
```

TOWARDS VOICE



Watson Speech to Text

The Speech to Text service converts the human voice into the written word.

Watson Text to Speech

Designed for streaming low-latency synthesis of audio from written text. The service synthesizes natural-sounding speech from input text in a variety of languages and voices that speak with appropriate cadence and intonation.

EXPRESSIVE VOICE

Text

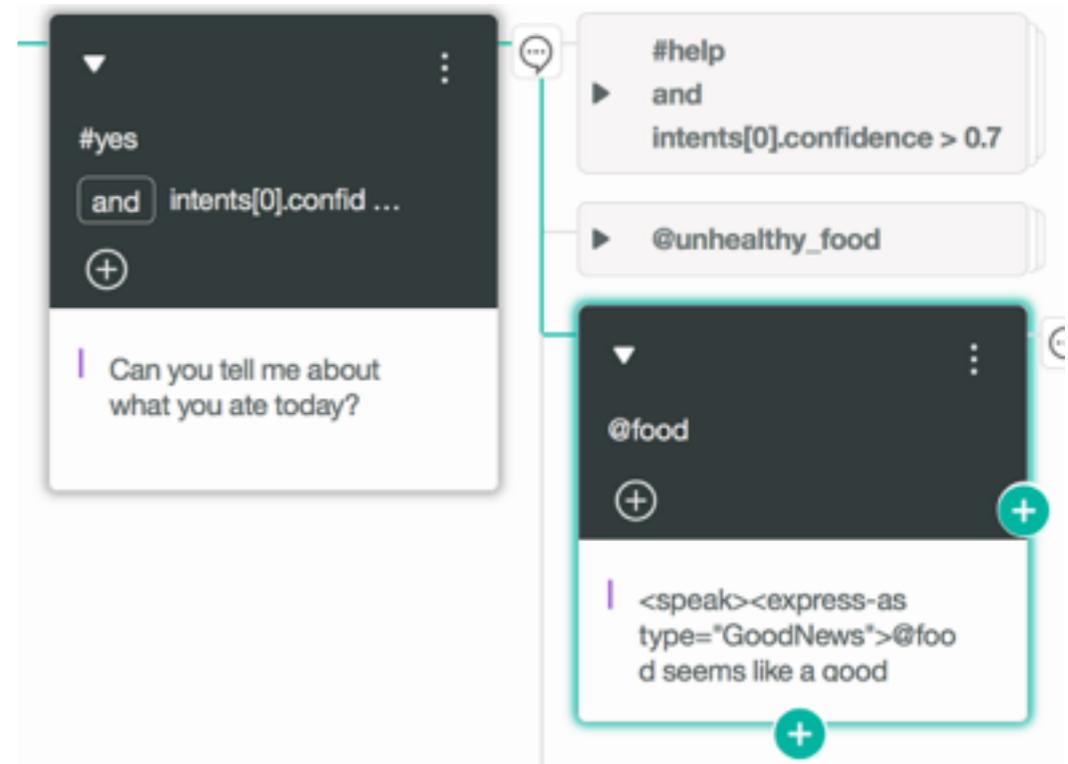
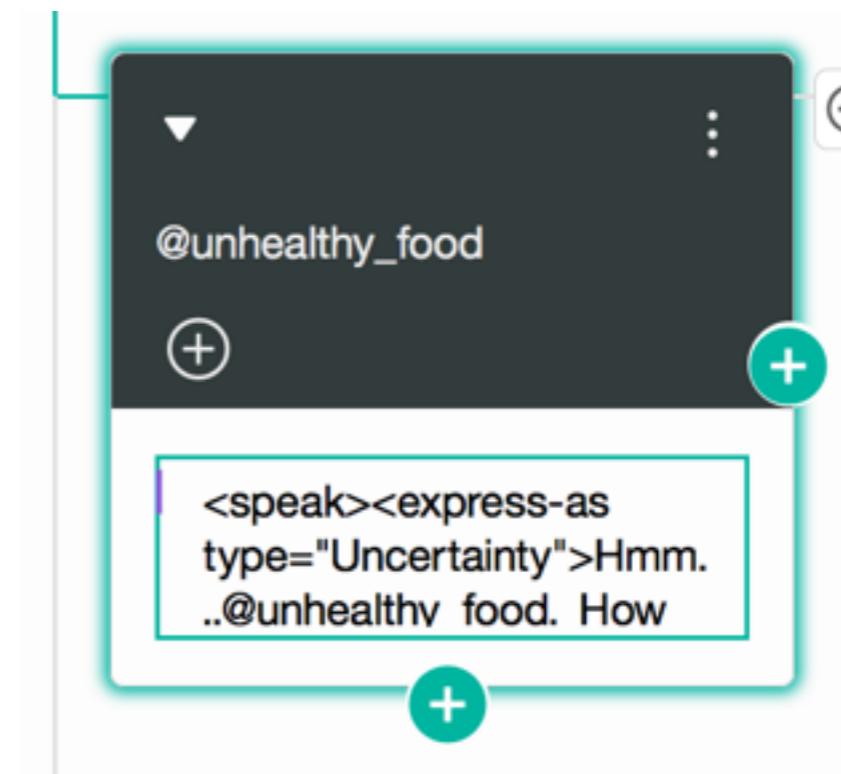
Expressive SSML

Voice Transformation SSML

Hello! I'm Allison but you can change my voice however you wish. <voice-transformation type="Custom" glottal_tension="-80%"> For example, you can make my voice a bit softer, </voice-transformation> <voice-transformation type="Custom" glottal_tension="40%" breathiness="40%"> or a bit strained. </voice-transformation><voice-transformation type="Custom" timbre="Breeze" timbre_extent="60%"> You can alter my voice timbre making me sound like this person, </voice-transformation> <voice-transformation type="Custom" timbre="Sunrise"> or like another person in your different applications. </voice-transformation><voice-transformation type="Custom" breathiness="90%"> You can make my voice more breathy than it is normally. </voice-transformation><voice-transformation type="Young" strength="80%"> I can speak like a young girl. </voice-transformation><voice-transformation type="Custom" pitch="-30%" pitch_range="80%" rate="60%" glottal_tension="-80%" timbre="Sunrise"> And you can combine all this with

This is a simple conversation to demonstrate how a user's emotional tone can be used to provide more tailored and empathetic responses by integrating Watson Conversation and Watson Tone Analyzer. If you get stuck, type 'help'. 

Please enter your twitter handle (e.g.,) for a more personalized experience. If you prefer not to share your twitter handle, please respond with 'no'.



Type something (for suggestions, type 'help').

Copyright: IBM, 2016

“

Combine Watson Services to understand users, their tones, and provide more effective conversation experiences !

In Conclusion ...

Copyright: IBM, 2016

USEFUL LINKS

- Food coach application: <https://github.com/vibhasinghal/food-coach>
- Integrating tone and conversations:
 - <https://developer.ibm.com/watson/blog/2016/10/17/creating-a-compassionate-conversational-agent-using-watson-tone-analyzer-and-watson-conversation-services/>
 - <https://medium.com/ibm-watson-developer-cloud/build-a-chatbot-that-cares-part-1-d1c273e17a63#.sm2184cg6>
- Watson Services: <https://www.ibm.com/watson/developercloud/services-catalog.html>