

# Design Fictions of Everyday Brain-Computer Interface Adoption

The following set of 4 design fictions accompany the paper:

Richmond Y. Wong, Nick Merrill and John Chuang. (June 2018). [When BCIs have APIs: Design Fictions of Everyday Brain-Computer Interface Adoption](https://doi.org/10.1145/3196709.3196746). In *Proceedings of the ACM Conference on Designing Interactive Systems (DIS '18)*. <https://doi.org/10.1145/3196709.3196746>

# Google P300 API

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The Google P300 API allows use to classify the [P300 \("oddball"\) response](#) in real time from a provided stream of EEG signals.

You can use this response for a number of different applications. See our [example app gallery](#) for more examples.

## Using the API

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First, initialize the API with your API keys (which you can generate in your user dashboard).

```
p300 = require('google-p300-api')(API_KEY, API_SECRET)
```

Next, classify an EEG reading. (EEG readings should be an array of floats, preferably raw device data).

```
p300.exists(reading, {
  removeBlinks: true,
}, function (detection, err) {
  if (err)
    console.log(err)
  else
    console.log('P300 detected?', detection)
})
```

If you want, you can use our tools to create a [synchronized stream](#) of stimuli IDs and raw device data, which you can feed into our [the Node stream API](#) to produce a list of P300s relating to stimulus IDs.

```
syncedStimulusStream
  .pipe(p300)
  .on('data', function (detection) {
    console.log('P300 detected on stimulus', detection.stimulus)
  })
```

## Notes

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The P300 API handles a few other data cleaning steps, for convenience:

- Blink removal
- Background noise filtering
- Signal quality detection

This project was completed in collaboration with Professor Marc Georgi at EFDN University. The API was trained on P300 responses taken from the [EFDN oddball response dataset](#). Our machine learning models are openly available via TensorFlow [here](#).

# Google P300 API: Consequence of training data?

The API documentation states

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The API was trained on P300 responses taken from the EFDN oddball response dataset.

Looking into this dataset a little bit more, it looks like people were asked to watch a stream of images while wearing some EEG device, and keep an eye out for one particular image. When the target image came in, the EEG device would register a P300 "oddball" response, even if the recognition was unconscious or too fast to see (right?)

My question is, do these "lab" P300 responses really apply to other things? For example, if you are looking over messages to see if any of them are abusive, will we really see the "same" P300 response?

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[edited Jul 5 '20 at 8:02](#)

[asked Mar 3 '20 at 2:03](#)



[Jay Shapinsky](#)

16.1k 24 81 131

Do you have a data sample? Does the API recognize responses in it? – [Ichi Kobayashi](#) Mar 3 '20 at 2:04

the API definitely recognizes P300 responses in my data. Most of the time they do seem to relate to abusive language in the messages (our use case). My question is whether the P300 response is *really* applying to our data problem here, or if it's picking up on some P300 response that just happens to align with our data now and again? – [Jay Shapinsky](#) Mar 3 '20 at 2:09

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## 4 Answers

[active](#)

[oldest](#)

[votes](#)

12

The P300 is a general response, and should apply perfectly well to your problem. In other words, if you are detecting any P300s, they are probably the P300s you are looking for.

Remember, the P300 is a pre-conscious response. So, your brain does not "know" what it means. It is basically flagging the data for later processing. This is why the oddball response is such a good signal for BCI, for the NSFW dataset you mention and for any other problem that requires flagging anomalies.

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[answered Mar 3 '20 at 2:10](#)



[Hans Gaffer](#)

60.6k 7 137 183



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## Memorandum: Upgrading Content Moderation with P300 “BrainPower” Services

Hi team,

As you may have heard, we've had an increase in reports by our Sparks™ Community of inappropriate content being shared by other Sparks™ (as well as increased U.S. media reports of these reports). We've been able to use our spam detection filters and our world-wide network of content moderator workers on Amazon Mechanical Turk, but to limited success. There's a lot of inappropriate content which those filters aren't able to catch because they don't do well at distinguishing between harassment & threats on one hand, and teasing, flirting & joking on the other. We don't have enough U.S.-based content moderation workers signed up to keep up with the massive amounts of flagged content from U.S. users, and a lot of international Turkers don't have the contextual clues to understand if the images, videos, messages, and VR clips are inappropriate or not.

As announced earlier this week, we will begin deploying our “BrainPower Moderation Service” to address these problems, making use of our crowd verification system on Mechanical Turk and Amazon's new support for EEG-based tasks. This will allow us to process content moderation in a faster, more cost-effective way while making use of the unique human ability to see data contextually.

Our IT staff has developed a set of new Turker tools using P300. Flagged content is then flashed on the screen – the Turkers' subconscious will immediately be able to see if the content is appropriate or not. When they see something that they think is inappropriate, their brain waves will initiate P300 response which will be captured by the EEG sensor. Content can be flashed faster than it takes for a person to consciously read or analyze the material, allowing Turker moderators to 1) process more flagged content, and 2) avoid consciously seeing lots of bad content.

The basic guidelines are as follows. More detailed instructions can be found on the intranet (document 17-5101) and in the attached documentation.

1. When creating the HIT, make the task only available to Turkers with an EEG module.
2. Make a training task, where the Turker looks at several pieces of content that we know are appropriate or inappropriate so that the system can record baseline EEG readings.
3. Select the batch of newly flagged content that you want Turkers to process.
4. With this speed, we calculate that a person can look at, on average, about 100 pieces of still content or 25 pieces of video or VR content per minute. Thus we recommend paying \$0.30 for every 100/25 pieces of still/dynamic content a worker looks at. At this rate, the Turker will make a fair wage of \$18/hour.
5. To ensure accuracy and prevent cheating, we ask that each piece of flagged content be looked at by at least 10 workers and achieve an inter-rater reliability of at least 0.9.

We've created a template that you can download for use ([intranet document 12-102](#)). Thanks for helping us implement the new P300 system, which will help provide a better and more robust experience for our clients! We'll have additional training sessions next week. If you have any questions, contact Jill or Michael in IT, [jill@sparkthetmatch](mailto:jill@sparkthetmatch) or [mike@sparkthetmatch](mailto:mike@sparkthetmatch).

- Pat

# SparkTheMatch.com Content Task - Discussion

Thread Tools Search this Thread Rate Thread

Dec 28, 20, 10:40 am

#1

Original Poster  
**jeffking0293**  
EEG Task Maestro

Join Date: Jun 2018  
Location: Kansas  
Posts: 1,614

## SparkTheMatch.com Content Task - Discussion

Updated [SparkTheMatch.com Content Moderation job on MTurk](#). Remember, this task requires an EEG headset (I use this one, \$99 on Amazon - use my affiliate link!). Yes there's a significant investment here, but the job is quite lucrative (About \$3 for 10 minutes of work).

*Thinkin' got my chips cashed in. Keep turkin', like the do-dah man. Together, more or less in line, just keep turkin' on.* - The Grateful Dead (sort of)

Dec 28, 20, 10:55 am

#2

**TaskMagic**  
MTurk Expert

Join Date: Oct 2016  
Posts: 5,149

Thought it was pretty good. Here's my experience: I usually come home from my day job (working with GigChef, six 2-hour line chef shifts a day - yes really). Then I make sure my 2 y/o son is asleep or put him asleep if I need to. So I'm dead tired - way too tired to drive Lyft/Uber/Wheels etc. And I can't deal with people.

So instead I usually do SparkTheMatch tasks. The deal is, it tells you a bunch of actions that are prohibited on the site (threats, harassment, non-consensual nudes, etc), then it flashes a bunch of text and pics at you. You basically just have to keep your eyes open (I literally use my hands to open my eyelids sometimes). Supposedly they can detect if you subconsciously notice prohibited content and use that to delete bad stuff from their site... \*shrug\*... Pays decently well though!

Dec 28, 20, 12:33 pm

#3

**randylikesbooks**

Join Date: Sep 2018  
Location: NYC, USA  
Posts: 309

Is anyone able to keep up with the suggested pace? It's been taking me about 5 minutes to get through 100 images, which is only giving me a couple dollars per hour.

Also one of my task batches got denied without explanation. I got an error on the "training task" - apparently I identified one of the images wrong - so maybe it's that? Although I don't know how to get it right besides "thinking harder". And it's getting annoying looking at all these images. 😞 I might end up trying to find other tasks from other companies if this keeps happening.

Dec 28, 20, 12:46 pm

#4

Original Poster  
**jeffking0293**  
EEG Task Maestro

Join Date: Jun 2018  
Location: Kansas  
Posts: 1,614

@randylikesbooks - In my experience, you have to do it like @taskmagic's strategy, just sort of sit back and stare at the screen. It should help you get the speed up too.

I will say I remember the good old pre-EEG days when SparkTheMatch paid a lot more for content moderation tasks. While I can do more reviews per minute now, they pay a lot less for each content review. But what can you do...

Can you give more details about the errors you've found? I've found that despite what you'd think, the EEG headset isn't that exact, so sometimes it's hard to tell if it's your thoughts that are wrong, or if it's reading the wrong thoughts.

*Thinkin' got my chips cashed in. Keep turkin', like the do-dah man. Together, more or less in line, just keep turkin' on.* - The Grateful Dead (sort of)

Dec 28, 20, 2:07 pm

#5

**JamJam**

Join Date: Jan 2020  
Location: Interwebs  
Posts: 518

@randylikesbooks, you've probably get the headset setup wrong, or it's not making contact with your head correctly. Or you bought too cheap a headset. (I've heard about problems from other folks for the headset that @jeffking0293 recommends...)

But as for the content complaints - if you're doing it right, you shouldn't be consciously seeing the actual content (at least with static pictures and text). Plus, it says \*content moderation\* in the title - if you don't want to be exposed to the content, then \*read the description\* and \*don't\* click accept!! 😊