From: Jeffrey Epstein <jeevacation@gmail.com>
To: Ed Boyden <[redacted]>
Subject: Re: Thanks
Date: Tue, 28 May 2013 12:33:45 +0000

---

agreed, .

On Tue, May 28, 2013 at 8:27 AM, Ed Boyden <[redacted]> wrote:

> I agree we need to analyze the music -- for the brain, that would be
> the behavior, I guess? -- but I would also argue that focusing on the
> music has been the traditional way people have done things, yielding
> the very successful field of psychology. Right now we can delve into
> the mechanisms by which the music is generated, however -- and almost
> certainly that will require far better descriptors and understandings
> of the music itself! So in summary, to advance psychology beyond the
> current state, we need radically new tools to map the brain, and then
> we will have such detailed mechanism that we can push the description
> of the music forward too.
>
> Ed
>
> On Tue, May 28, 2013 at 8:19 AM, Jeffrey Epstein <jeevacation@gmail.com> wrote:
> > agreed.. but i also need to understand the music and well as the musician,
> > . can we recognize music from the signals. probably. ? regularities ,
> > coherence. . is there a program that can say this signal is a music as
> > opposed to conversation.? you are doing great work and i will follow
> > closely
> >
> >
> > On Tue, May 28, 2013 at 7:15 AM, Ed Boyden <[redacted]> wrote:
> >>
> >> I certainly hope that nobody is proposing absurd reductionism!
> >> Certainly we are not. We do value *precision* however -- we need to
> >> measure the system at the correct level of abstraction, to find the
> >> building blocks that we know are important, if we ever want to be
> >> constructive and build up again.
> >> The problem with analogies that are very simple and
> >> physics-oriented, is that while they can display complexity to be
> >> sure, they rarely compute anything particularly profound -- even
> >> things like lightning or self-organized criticality or even chaos.
> >> They look cool, but they don't generate intelligence, right?
> >> For the brain: there's complexity of structure that is inherent, and
> >> that while reductionism is not the goal, it's still true that we need
> >> **precision** if the data we acquire will be worth modeling. (The
> >> closest analogy might be weather: we can predict the weather far
> >> better now than we could even a decade or two ago, and the reason is
> >> that we have the right kinds of data now -- satellite data,
> >> distributed data, etc. -- when you have that kind of data, at the
> >> density and time resolution that are appropriate, then the physics
> >> becomes meaningful and even modelable.)

>> That's why we need to map the entire brain: then we can watch as
>> information flows from sensation areas, through circuits that combine
>> those sensory inputs with internal process like thoughts and emotions,
>> and then into motor and output areas that cause behavior.
>> To pick a piano analogy: if you want to understand a musician, it's
>> not enough just to watch a finger, or a string, or the sheet music.
>> You need to observe the process as the person learns the music,
>> controls the keys, and then creates the full musical experience,
>> right?
>>
>> Ed
>>
>> On Tue, May 28, 2013 at 7:06 AM, Jeffrey Epstein <jeevacation@gmail.com>
>> wrote:
>> > sorry, i posed a sloppy question. / From the view of understanding
>> > music, more akin to thought, i think that you need to careful that
>> > reductionism isn't taken to the absurd level, of looking at the string
>> > makeup and how it causes sympathetic vibrations, , might look like
>> > intent .
>> > there is a code that says , hit these strings and a melody develops.
>> > it
>> > has a temporal component , it has amplitude, but unless it is looked at
>> > as
>> > a whole the music is not there. I like aversive , as it appears hard
>> > wired, as another out side idea, look at the mathematics of
>> > lightning, it descrives well neural firings, with energy minimization.
>> >
>> >
>> > On Tue, May 28, 2013 at 6:54 AM, Ed Boyden <[redacted]> wrote:
>> >>
>> >> The piano itself isn't quite the analogy to the brain, because it has
>> >> no memory, independent of the human playing it. After the finger
>> >> lifts, the strings quiets down.
>> >> So I am assuming that we need to model the human playing the piano?
>> >> Suppose, say, we want to understand what emotion is generating the
>> >> music.
>> >> If we could measure activity in the brain of the person playing the
>> >> piano, and could predict what melody or sequence of notes the person
>> >> would play, based on that activity, then we could infer that the
>> >> internal brain activity was causing the melody. This inference might
>> >> be convertible into proof, if we were to stimulate the brain and play
>> >> back an activity pattern into the brain, seeing how that would alter
>> >> the melody being played. And if we have a molecular map of the brain,
>> >> which we could simulate on a computer, we could through biophysical
>> >> simulation begin to see how the molecular interactions between cells,
>> >> yield dynamics of the network, which then yield the sequence of finger
>> >> commands that yield the music.
>> >> Thus, the finger is the interface between two dynamical systems --
>> >> the brain and the piano. Each of those dynamical systems has a
>> >> physical implementation that can be modeled, if we have three things:
>> >> -- mechanistic maps (piano: string lengths, material properties, etc.)
>> >> -- dynamics (piano: the finger movements and temporal scuplting)
>> >> -- control (piano: we can modulate the human and see how the music
>> >> changes)

>> >>
>> >> Ed
>> >>
>> >> On Tue, May 28, 2013 at 6:46 AM, Jeffrey Epstein
>> >> <jeevacation@gmail.com>
>> >> wrote:
>> >> > give me a piano music analogy, / watching the strings, ? after key
>> >> > inputs,? interesting byt not dispositive of anything meaningful
>> >> >
>> >> >
>> >> > On Tue, May 28, 2013 at 6:40 AM, Ed Boyden <[redacted]> wrote:
>> >> >>
>> >> >> I agree we need a top-down! Two thoughts:
>> >> >> -- Yes, developing mapping circuit technology and then applying it
>> >> >> to
>> >> >> simple behaviors -- hard wired aversive stuff -- is indeed a way to
>> >> >> go. As we plan out these mapping technologies, we're actually
>> >> >> beginning experiments to map out these aversive things too. We are
>> >> >> collaborating with many groups along these lines. We need to finish
>> >> >> the fundamental technology building so that we can obtain maps at
>> >> >> the
>> >> >> right level, and then we can acquire datasets that are compatible
>> >> >> with
>> >> >> top-down theory, to be sure.
>> >> >> -- Another way to think top-down is to work our way inwards, from
>> >> >> the
>> >> >> observables. We know that behavior -- movement, speech, other
>> >> >> action
>> >> >> -- is observable; if a feeling or thought is prominent enough, it
>> >> >> will
>> >> >> be manifest through these channels as an observable. Thus we can
>> >> >> also
>> >> >> try to infer internal states by their effects on observables, and
>> >> >> then
>> >> >> to associate neural activity with these internal states and
>> >> >> observables. In theory this should scale to arbitrarily complex
>> >> >> internal states, not just simple aversive states.
>> >> >>
>> >> >> Best,
>> >> >> Ed
>> >> >>
>> >> >> On Thu, May 23, 2013 at 11:24 AM, Jeffrey Epstein
>> >> >> <jeevacation@gmail.com>
>> >> >> wrote:
>> >> >> > i think you need a top down as well as bottom up. as looking at
>> >> >> > my
>> >> >> > piano
>> >> >> > while being played, i can go string by string (not string
>> >> >> > theory
>> >> >> > strings). hammer by hammer, material of string , molecular
>> >> >> > interaction
>> >> >> > naturalvibration, harmonics, sympathtice vibration but i
>> >> >> > would
>> >> >> > not

>> >> >> > hear
>> >> >> > or understand the melody or music being played. I believe that
>> >> >> > each
>> >> >> > individual has its own encrpytion algorithm, , as the neural
>> >> >> > net
>> >> >> > grows
>> >> >> > it encrypts some input signals. some are hard wired. so instead
>> >> >> > of
>> >> >> > emotion
>> >> >> > , movement, speech, etc, I think a proitable area of initail
>> >> >> > inquiry
>> >> >> > should
>> >> >> > be the hard wired aversive stuff only. smell of dead meat. .
>> >> >> > reaction
>> >> >> > to fire. i tihnk that aesthectics will be the greatest ration of
>> >> >> > output to
>> >> >> > input. . or the least energy to decode. . dissonance, cannot
>> >> >> > be
>> >> >> > easily
>> >> >> > resolved so the energy to decode the information, is too high and
>> >> >> > becomes
>> >> >> > painful. Does a dream state come upon us, or do we dream all
>> >> >> > the
>> >> >> > time
>> >> >> > and concious state relegates the dreams to behind the screen.
>> >> >> > When
>> >> >> > sleep
>> >> >> > deprived the dreams begin to pop through the screen, as
>> >> >> > hallucinations.
>> >> >> > a breakdown of the screen , results in a form of schizphrenia,
>> >> >> > where
>> >> >> > they
>> >> >> > cann no longer distiguish between voices. dream produced while
>> >> >> > awake
>> >> >> > or
>> >> >> > the
>> >> >> > awake state angel on the shoulder whispering. . I am an avid
>> >> >> > funder
>> >> >> > of
>> >> >> > the bleeding edge in many fields. keep me up to date on what you
>> >> >> > are
>> >> >> > doing, and hope to see you in your own habitat.
>> >> >> >
>> >> >> >
>> >> >> > On Thu, May 23, 2013 at 11:04 AM, Ed Boyden <[redacted]>
>> >> >> > wrote:
>> >> >>
>> >> >> Hi Jeffrey,
>> >> >>
>> >> >> Yes, it was great chatting about all the ways neuroengineering is
>> >> >> going to go in the coming years, revealing both fundamental
>> >> >> mechanistic brain maps, and providing the control knobs for
>> >> >> fixing
>> >> >> brain disorders and understanding complex phenomena like

>> >> >> >> consciousness. Would be great to talk about how then to make
>> >> >> >> mathematical sense of these maps and control knobs... arguably
>> >> >> >> the
>> >> >> >> big stumbling block to date is the lack of good data, but that's
>> >> >> >> about
>> >> >> >> to change, thanks to our current and future efforts! Then we
>> >> >> >> will
>> >> >> >> have many things that require deep mathematics to understand!
>> >> >> >>
>> >> >> >> Ed
>> >> >> >>
>> >> >> >> On Thu, May 23, 2013 at 1:16 AM, Joi Ito <[redacted]>
>> >> >> >> wrote:
>> >> >> >> > Hi Jeffrey.
>> >> >> >> >
> > Thanks for a really enjoyable conversation and your hospitality
> > tonight.
> > Look forward to connecting again and receiving you at the Media
> > Lab
> > on my
> > turf. ;-)
>
> - Joi
>
>
>
>
>
>> >> >> >> --
>> >> >> >> Ed Boyden, Ph. D.
>> >> >> >> Leader, Synthetic Neurobiology Group
>> >> >> >> Associate Professor, MIT Media Lab and McGovern Institute,
>> >> >> >> Departments of Biological Engineering and Brain and Cognitive
>> >> >> >> Sciences
>> >> >> >> Benesse Chair, New York Stem Cell Foundation-Robertson
>> >> >> >> Investigator,
>> >> >> >> and Paul Allen Distinguished Investigator
>> >> >> >> MIT, Room E15-421, 20 Ames St., Cambridge, MA 02139
>> >> >> >> office - [redacted]
>> >> >> >> cell - [redacted]
>> >> >> >> email - [redacted]
>> >> >> >> fax - [redacted]
>> >> >> >> skype - [redacted]
>> >> >> >> web - http://syntheticneurobiology.org
>> >> >> >> twitter - [redacted]
>> >> >> >>
>> >> >> >
>> >> >> >
>> >> >> >
>> >> >> >
> > --
> > **********
> > The information contained in this communication is
> > confidential, may be attorney-client privileged, may
> > constitute inside information, and is intended only for
> > the use of the addressee. It is the property of

>> >> >> > Jeffrey Epstein
>> >> >> > Unauthorized use, disclosure or copying of this
>> >> >> > communication or any part thereof is strictly prohibited
>> >> >> > and may be unlawful. If you have received this
>> >> >> > communication in error, please notify us immediately by
>> >> >> > return e-mail or by e-mail to jeevacation@gmail.com, and
>> >> >> > destroy this communication and all copies thereof,
>> >> >> > including all attachments. copyright -all rights reserved
>> >> >>
>> >> >>
>> >> >>
>> >> >> --
>> >> >> Ed Boyden, Ph. D.
>> >> >> Leader, Synthetic Neurobiology Group
>> >> >> Associate Professor, MIT Media Lab and McGovern Institute,
>> >> >> Departments of Biological Engineering and Brain and Cognitive
>> >> >> Sciences
>> >> >> Benesse Chair, New York Stem Cell Foundation-Robertson Investigator,
>> >> >> and Paul Allen Distinguished Investigator
>> >> >> MIT, Room E15-421, 20 Ames St., Cambridge, MA 02139
>> >> >> office - [redacted]
>> >> >> cell - [redacted]
>> >> >> email - [redacted]
>> >> >> fax - [redacted]
>> >> >> skype - [redacted]
>> >> >> web - http://syntheticneurobiology.org
>> >> >> twitter - [redacted]
>> >> >
>> >> >
>> >> >
>> >> >
>> >> > --
>> >> > **********
>> >> > The information contained in this communication is
>> >> > confidential, may be attorney-client privileged, may
>> >> > constitute inside information, and is intended only for
>> >> > the use of the addressee. It is the property of
>> >> > Jeffrey Epstein
>> >> > Unauthorized use, disclosure or copying of this
>> >> > communication or any part thereof is strictly prohibited
>> >> > and may be unlawful. If you have received this
>> >> > communication in error, please notify us immediately by
>> >> > return e-mail or by e-mail to jeevacation@gmail.com, and
>> >> > destroy this communication and all copies thereof,
>> >> > including all attachments. copyright -all rights reserved
>> >>
>> >>
>> >>
>> >> --
>> >> Ed Boyden, Ph. D.
>> >> Leader, Synthetic Neurobiology Group
>> >> Associate Professor, MIT Media Lab and McGovern Institute,
>> >> Departments of Biological Engineering and Brain and Cognitive Sciences
>> >> Benesse Chair, New York Stem Cell Foundation-Robertson Investigator,

>> >> and Paul Allen Distinguished Investigator
>> >> MIT, Room E15-421, 20 Ames St., Cambridge, MA 02139
>> >> office - [redacted]
>> >> cell - [redacted]
>> >> email - [redacted]
>> >> fax [redacted]
>> >> skype - [redacted]
>> >> web - http://syntheticneurobiology.org
>> >> twitter - [redacted]
>> >
>> >
>> >
>> >
>> > --
>> > **********
>> > The information contained in this communication is
>> > confidential, may be attorney-client privileged, may
>> > constitute inside information, and is intended only for
>> > the use of the addressee. It is the property of
>> > Jeffrey Epstein
>> > Unauthorized use, disclosure or copying of this
>> > communication or any part thereof is strictly prohibited
>> > and may be unlawful. If you have received this
>> > communication in error, please notify us immediately by
>> > return e-mail or by e-mail to jeevacation@gmail.com, and
>> > destroy this communication and all copies thereof,
>> > including all attachments. copyright -all rights reserved
>>
>>
>>
>> --
>> Ed Boyden, Ph. D.
>> Leader, Synthetic Neurobiology Group
>> Associate Professor, MIT Media Lab and McGovern Institute,
>> Departments of Biological Engineering and Brain and Cognitive Sciences
>> Benesse Chair, New York Stem Cell Foundation-Robertson Investigator,
>> and Paul Allen Distinguished Investigator
>> MIT, Room E15-421, 20 Ames St., Cambridge, MA 02139
>> office - [redacted]
>> cell - [redacted]
>> email - [redacted]
>> fax - [redacted]
>> skype - [redacted]
>> web - http://syntheticneurobiology.org
>> twitter - [redacted]
>
>
>
>
> --
> **********
> The information contained in this communication is
> confidential, may be attorney-client privileged, may
> constitute inside information, and is intended only for

> the use of the addressee. It is the property of
> Jeffrey Epstein
> Unauthorized use, disclosure or copying of this
> communication or any part thereof is strictly prohibited
> and may be unlawful. If you have received this
> communication in error, please notify us immediately by
> return e-mail or by e-mail to jeevacation@gmail.com, and
> destroy this communication and all copies thereof,
> including all attachments. copyright -all rights reserved

--
Ed Boyden, Ph. D.
Leader, Synthetic Neurobiology Group
Associate Professor, MIT Media Lab and McGovern Institute,
Departments of Biological Engineering and Brain and Cognitive Sciences
Benesse Chair, New York Stem Cell Foundation-Robertson Investigator,
and Paul Allen Distinguished Investigator
MIT, Room E15-421, 20 Ames St., Cambridge, MA 02139
office - [redacted]
cell - [redacted]
email - [redacted]
fax - [redacted]
skype - [redacted]
web - http://syntheticneurobiology.org
twitter - [redacted]

--