TRACK 4 32:43

11 total Speakers—many are inaudible. Known: Joe Bogen, Bruno '70, Jenny '84, and Peggy. This is a continuation of the APA tribute in California —Joe Bogen spoke in many of the tracks I transcribed in Spring.

Speaker 1 Unknown: [INAUDIBLE 00:00:00] mapping [INAUDIBLE 00:00:04 - 00:00:07] and then went on to continue working on regeneration of nerves [INAUDIBLE 00:00:12 - 00:00:15] regeneration [INAUDIBLE 00:00:16 - 00:00:26].

Speaker 2 Joe Bogen:
I'm Joe Bogen. I first really became acquainted with Roger in 1955 and had interacted...interacted with him in a variety of capacities. [INAUDIBLE 00:00:41] relationships [INAUDIBLE 00:00:43] subsequent 35 years.

Speaker 3 Unknown:
[INAUDIBLE 00:00:49] 35 years.

Speaker 4 Unknown:
[INAUDIBLE 00:00:52].

Speaker 3 Unknown:
More than that. More than that. 38! More than that.

Speaker 5 Unknown:
What's that? I'm not giving a talk.

Speaker 6 Unknown:
Oh, it's only the speakers.

Speaker 5 Unknown:
Yes.

Speaker 6 Unknown:
Oh. All right. [INAUDIBLE 00:01:02] identify yourself and tell them when [INAUDIBLE 00:01:07].

Speaker 7 [Unknown; worked with Sperry in '57 and '69, been in Scotland from 1971-[1994?]**:**
Yes. I came from New Zealand to work with Roger Sperry in 1957 and I did research on visual...learning visual perception and learning [INAUDIBLE 00:01:16 - 00:01:19]. And I went on from there to work in [INAUDIBLE 00:01:22] split-brain technique [INAUDIBLE 00:01:25]. And then I went to Harvard and worked on [INAUDIBLE 00:01:30] development. Came back in 1969 to work with Sperry and Jeree Levy [INAUDIBLE 00:01:37] patients and spent quite a bit of time in the lab at that point. And then I went to Scotland, where I've been since 1971 [INAUDIBLE 00:01:46] psychology, child psychology, and psychobiology. [INAUDIBLE 00:01:52] I picked up the psychobiology [INAUDIBLE 00:01:55].

Speaker 6 Unknown:
Bruno.

Speaker 8 Bruno (worked with Sperry 1970):
I'm Bruno [INAUDIBLE 00:02:00] and I came to the lab [INAUDIBLE 00:02:02] in 1970. [INAUDIBLE 00:02:06 - 00:02:10]. I also have an interest in some of the other aspects of split-brain, like the mechanics [INAUDIBLE 00:02:18] right hemisphere [INAUDIBLE 00:02:19 - 00:02:29] verbal indicators [INAUDIBLE 00:02:32 - 00:02:35]. And I also [INAUDIBLE 00:02:37 - 00:02:47].

Speaker 6 Unknown:
And at last, Jenny.

Speaker 9 Jenny (worked with Sperry in '84):
[INAUDIBLE 00:02:53]. I was [INAUDIBLE 00:02:54] in Dr. Sperry's lab in 1984. [INAUDIBLE 00:02:59 - 00:03:06] a lot to do with mind-brain relationship [INAUDIBLE 00:03:09 - 00:03:12] for 19 years [INAUDIBLE 00:03:14 - 00:03:29] neurosurgeons [INAUDIBLE 00:03:30]. And then at the time [INAUDIBLE 00:03:34] came to work with Roger, I had [INAUDIBLE 00:03:38 - 00:03:42]. And at the time, I was also [INAUDIBLE 00:03:44] to get one side [INAUDIBLE 00:03:45] and I wanted to know how the psyche related to the brain, so I wrote Roger and decided to come and observe what they were doing in the lab. And I [INAUDIBLE 00:03:57 - 00:04:00] just worked on [INAUDIBLE 00:04:02] working on the same thing [INAUDIBLE 00:04:05 - 00:04:11].

Speaker 6 Unknown:
Thank you very much, Jenny. Our first speaker is Peggy [INAUDIBLE 00:04:16] from USC. Her topic is [INAUDIBLE 00:04:22] potential...potentials after the loss of consciousness. I'm going to save... Each speaker is going to speak with the audience. I'm going to save our questions for the end, and it gives us a chance to question people [INAUDIBLE 00:04:42] questions. Peggy.

Speaker 5 Unknown:
Peggy! Peggy!

Speaker 10 Peggy:
Thank you. [INAUDIBLE 00:04:51] the big question, so I hope [INAUDIBLE 00:04:57] the big question. Could I have the slide, please? Okay. [INAUDIBLE 00:05:14] is a cognitive potential which is a positive [INAUDIBLE 00:05:21], which includes about 300 [INAUDIBLE 00:05:26 - 00:05:33] stimulus. [INAUDIBLE 00:05:39 - 00:05:44] two different auditory [INAUDIBLE 00:05:48 - 00:05:51]. What was [INAUDIBLE 00:05:52 - 00:06:12]. As you can see from this slide, the P3 occurs just in response to the [INAUDIBLE 00:06:22]. The P3 [INAUDIBLE 00:06:27] cognitive potential because it has to be associated with [INAUDIBLE 00:06:36 - 00:06:42] difficulty of memory; that is, if it is more difficult to discriminate between the two cones, the latency of the P3 becomes prolonged. Also, the association of the P3 with cognition has been demonstrated by a study which has compared dementia patients with those who have severe dementia or are not demented at all. Most but not all studies have shown that the latency is prolonged and [INAUDIBLE 00:07:48] increased just for those patients who have severe dementia. For the typical [INAUDIBLE 00:08:04 - 00:08:07] a patient. Originally, the patient was instructed to pay attention to the real stimulus and to [INAUDIBLE 00:08:24] which occurred. [INAUDIBLE 00:08:28] it was obvious the earlier study with the dementia patients is they didn't comprehend what they were supposed to do, yet they did have [INAUDIBLE 00:08:46]. Therefore, specific studies were done where the patients were given no instructions, and a P3 is still elicited. This is called the passive paradigm. [INAUDIBLE 00:09:13] that the P3 can be elicited from babies. So, we wanted to know at what level of consciousness could a P3, which is supposed to be cognitive potential, be elicited. So, obviously, we [INAUDIBLE 00:09:47] with patients who were in coma at USC, so we decided we would give it a try and to see, first of all, does the P3 occur in patients in coma; second, if it does, is it associated with prognosis.

Coma, of course, is a pathological condition with different levels of severity. One of the universally accepted measures of the level of coma is the Glasgow Coma Scale. The lower the score, the deeper the level of coma. The lowest score possible is 3; the highest is 15. To assess outcome from coma a second scale, which is widely used, is the Glasgow Outcome Score. Here again, the lower the score, the worse the outcome. I'd like to note that if the patient has a score of 3, [INAUDIBLE 00:11:53 - 00:11:57] that the patient has awakened.

So, we tested 20 patients with a Glasgow Outcome Score of between the range of 3 to 14. All of these patients were nontraumatic coma. The assessment of outcome was performed...was defined as the best scores before death or [INAUDIBLE 00:12:49]. Of those patients who didn't die or were not [INAUDIBLE 00:12:59], they were assessed [INAUDIBLE 00:13:03] after the coma. The technical aspects won't a whole lot of you, but I want to say that this [INAUDIBLE 00:13:24] paradigm which is used with awake patients. Also, the recording electrodes are placed over the frontal, the central, and the parietal areas of the brain. [INAUDIBLE 00:13:56].

Speaker 6 Unknown: [INAUDIBLE 00:13:59].

Speaker 10 Peggy:

Well, to all of our surprise, [INAUDIBLE 00:14:09] after the first three or four patients, we did get a patient that did have a really definite P300. This shows that out of the 20 patients, there were six that had a P3. If you will look at the column [INAUDIBLE 00:14:40], you will see that there is a [INAUDIBLE 00:14:46 - 00:14:51], which is [INAUDIBLE 00:14:52 - 00:14:55] response to the [INAUDIBLE 00:14:58]. The P3 was present in patients with a coma score below a four or five, which is a very deep level of coma. Five of the six patients with a P3 awoke. Four of these had an outcome score of three, which is a severe disability. One had an outcome score of four, which is a moderate disability. [INAUDIBLE 00:16:00 - 00:16:04] the patients who had a P3 were significantly associated with awakening from coma. This is a patient which we followed more closely. She was a 32-year-old woman who was dealing with a stroke [INAUDIBLE 00:16:42 - 00:16:51]. As you will see, she had a real defined P3 at the parietal P3 electrode. The difference wave form, which is on the right, was obtained by subtracting the two waves. They show that the difference wave form actually includes the presence of the P3 and validates that it is truly present. This test was performed 12 days after the onset of coma. Her coma score was 5 at this time.

This is [INAUDIBLE 00:18:05] test. This was performed four months after coma. The significance of this is that the P3 is now more prominent at the...at the frontal electrode. [INAUDIBLE 00:18:35 - 00:18:39] looked at the passive P3 paradigm for awake patients [INAUDIBLE 00:18:49] that the P3 was more prominent at the electrode. So, possibly this is an indication of a change of consciousness of the patient. At this time, her coma score is nine. A couple of nights later, she was discharged with an outcome score of three.

So, in conclusion, we were able to demonstrate that this cognitive potential [INAUDIBLE 00:19:51 - 00:19:59] was present in patients in deep, deep coma. Further, the presence of the P3 was a significant indicator of awakening, and possibly we will be able to use the P3 to follow the course of patients in coma or the persistent vegetative state.

Speaker 6 Unknown:

Can we have the lights, please?

[Applause]

Speaker 6 Unknown:

[INAUDIBLE 00:20:45] questions, we have Dr. [INAUDIBLE 00:20:49] with some interesting questions about either consciousness, coma, or degenerative [INAUDIBLE 00:20:56]. I'm sure that somebody will pick up on it. Our next speaker is [INAUDIBLE 00:21:12].

Speaker 11 [Unknown-studied hemispheric specialization?]:

So, the main purpose of the present study was to investigate the [INAUDIBLE 00:21:33] nature of knowledge not immediately available to conscious awareness. Usually, in studies of hemispheric specialization, the task and the response are known to the subject -- they are explicit. But we wanted to know what would happen if the subject didn't know that something was happening -- say, when presentations are subliminal, presented very quickly. Explicit measures of cognition measure only one part of the mind, but there is another part

of the mind that's sitting there and can be tapped implicitly. Prosopagnosic patients, for instance--patients who don't recognize people by their faces alone--say they don't recognize a particular face. But if you use special methods, you can find that they do have knowledge, sitting there in the brain, of the person who they just denied knowing.

So, in this experiment, we used pictorial stimuli that were either neutral, positive, or negative, and this was determined by an independent group of subjects to whom we showed a series of pictures and we asked them to rate each picture according to whether or not they thought the picture was neutral or positive or negative, and I'm going to show you some examples now. So, this is an example of a neutral picture. And this, you can guess, is an example of a positive picture. This was an example of what subjects considered to be a negative picture. So, we took another group of subjects and we attached electrodes to the left and the right fingers of the left and the right hands, and we measured skin conductance responses. We told them to look at the screen in front of them and asked them to fixate the central fixation point. Then, they saw the neutral pictures either on the left or the right side of fixation, and we told them it will show the pictures, and all we wanted them to do is to look at the pictures. But, unbeknown to the subjects, while they were looking at the neutral pictures, another picture showed up on the screen, and the other picture was either a positive picture or a negative picture. And we measured their reactions with skin conductance responses -- physiological measures of their reactions. And here are the results. I don't have a pointer, so I'll describe to you. Is there...Is there a pointer? All right. Let's start off looking...

Speaker 6 Unknown:
[INAUDIBLE 00:25:00 - 00:25:11].

Speaker 11 [Unknown-studied hemispheric specialization?]:
I don't know. Oh, yeah, here.

Speaker 6 Unknown:
You got it.

Speaker 11 [Unknown-studied hemispheric specialization?]:
Okay, okay. You can see that now... You see the turquoise line indicate the responses of the right hemisphere -- always. The turquoise [INAUDIBLE 00:25:20] responses of the right hemisphere, and the red, the responses of the left. No interference. All they saw is neutral pictures, so we're not getting strong [INAUDIBLE 00:25:31], no strong responses. Here is the beginning of the interesting story. When the subjects saw the neutral picture in the left hemisphere but the negative picture in the right hemisphere, the responses were very strong. This is interhemispheric conditioning. This is the interhemispheric conditioning. Both pictures appeared in the same visual field -- the neutral picture and the negative picture. And you see that in the right hemispheres the reactions are very strong, but not in the left, and all of this is statistically significant. So, what it shows is that the right hemisphere has very strong reactions to negative stimuli even though the subject is unaware that there is another stimulus appearing there. We know that the subject didn't know because at the end of the experiment we said, "What do you think of those two pictures that you saw?" And the subjects would say, "What two pictures?"

Okay. What happened with the positive? Okay. Again, you see the no interference, that when they looked at neutral pictures, we don't get any interesting differences between the two hemispheres. The second panel shows the interhemispheric condition. When the neutral stimulus appeared in the left hemisphere and the right hemisphere had to react, we'd get very...very little reaction. This turquoise line from the right hemisphere, but very big reaction from the left hemisphere. The left hemisphere lacks positive stimuli. And within the left hemisphere, we are now getting significant differences for positive pictures. So, to summarize it, we get strong responses from the right hemisphere for negative stimuli, and we get stronger responses from the left hemisphere for positive stimuli. So, you could think that

all of this means that the right hemisphere likes negative pictures and the left likes positive pictures. And in truth, this is what these results show, but, to us, using the emotional balance is just a tool. We're not really interested in positive versus negative; what we are interested in is measuring non-verbal cognition. What happens in the two hemisphere if there is no linguistic cognition? The subjects did not know that this was happening, and yet they were having strong reactions.

So, in conclusion, each hemisphere appears to have a cognitive store of knowledge, knowledge of the world. The knowledge allows each hemisphere to react to pictures that we, in our culture, consider to be positive or negative, and each can be accessed without linguistic awareness. And, most importantly, there is non-verbal cognition in the left hemisphere, the left language hemisphere. And there is interhemispheric transfer of information without linguistic cognition. So, to say something about Roger Sperry and what he would have said if he were here, let's say, he would probably say, "What does all of this mean to the man in the street?" So, I guess I would say that what it means is this, to the man in the street. So, if you like someone and you have something good to say, positive news, be sure to stand on that person's right side. And given the same person that you like, let's say you have bad news to tell, again, be sure to stand on their right side because the left hemisphere doesn't like negative stories all that much, so you want to soften it and stand on their right. If you don't like someone and you have bad news, stand on the left side. It'll reach the right hemisphere very quickly. Okay.

Speaker 6 Unknown:
Thank you very much [INAUDIBLE 00:30:51]. But I had this insatiable need for Ben & Jerry vanilla ice cream. Our next speaker is Joseph Bogen, who's preparing his slides. And Joe's topic is going to be duality of consciousness in the split-brain.

Speaker 2 Joe Bogen: Consciousness, the word, is used by a great variety of people in an even greater variety of ways. What I want to talk about is what I believe is at the core of consciousness -- that is, subjectivity. It hurts me. I feel thirsty. Stuff like that. Whatever else consciousness may involve by anybody's definition, without that, there isn't any consciousness. It's produced by some cerebral mechanism. That's what we're looking for, is this mechanism that produces that. We are not trying to see consciousness. Trying to see consciousness may be [INAUDIBLE 00:32:09] trying to see the wind. You can't see wind. All you can see are the effects of wind. You have a fair idea of what the mechanism for wind is. It may be hundreds of miles away. And some people have an even better understanding of the mechanism than we do, but we know they have that. That's what we're looking for -- the mechanism that produces whatever it is that we're not going to see, that then has effects.

Speaker 6 Unknown:
All right.