**Track 7 20:14**

*8 Speakers, known info: Speaker 1 came to Caltech from U Minnesota around 1974, Speaker 2 Evelyn, Speaker 5 Harold. APA Tribute California*

Speaker 1 [Female came to Caltech from U Minnesota around 1974]:

They have served as hypothetical constructs to bridge the gap between brain and behavior. Although these constructs had usefulness in the past in organizing our thinking about clinical issues and research hypotheses, I believe it is now possible to move in the direction of establishing more valid and reliable intervening concepts, which are more closely linked to lawful relationships between brain changes, such as those seen on [INAUDIBLE 00:00:32] and behavior. The second major effect of my work in psychobiology has [INAUDIBLE 00:00:42] encouraged me to look at what might loosely be called more biologically-based measures, including things such as Lykkens's emergenic traits [INAUDIBLE 00:00:53 - 00:01:00] and certainly some of those things described here this morning. Such measures are, of course, not intrinsically better than [INAUDIBLE 00:01:07]. They must be validated [INAUDIBLE 00:01:09] measurable behavioral change.

I was a kind of accidental tourist in Sperry's Lab at Caltech 20 years ago or so. I came to Caltech from the University of Minnesota [INAUDIBLE 00:01:25] because my husband at that time elected to come to Caltech. In Minnesota I had been steeped in the radical behaviorism of B.F. Skinner and the logical empiricism of Deibel and Broadbent. There was a distinct culture shock coming to Caltech. For one thing, I soon discovered that women were not allowed to study there as undergraduates, nor were they allowed to be on the [INAUDIBLE 00:01:50] faculty. For another, I learned that Sperry and his group were looking to the brain to understand behaviors. They were searching for the [INAUDIBLE 00:02:00] or at least trying to corral it in one hemisphere or the other. Sperry also believed in an emergent consciousness and free will, something that would have caused Deibel and Broadbent to shudder. In those early days, I sometimes felt as though we were all engaged in [INAUDIBLE 00:02:18], but that I was the only one who got the joke. But as time went on, of course, I got [INAUDIBLE 00:02:26] caught up in the whole adventures, and when I left Sperry's Lab, I went to [INAUDIBLE 00:02:31] UCLA and spent many years looking at subcortical and cortical [INAUDIBLE 00:02:36] into learning [INAUDIBLE 00:02:38] unsuccessful effort, I must say.

Sperry himself was brilliant; enormously creative; as I mentioned before, a sculptor in his spare time; shy, certainly appearing to resemble what one thinks of as [INAUDIBLE 00:03:00], but a master of the ingenious experiment. And as all of us, I think, experienced, he could walk in [INAUDIBLE 00:03:10] experiment and tell you exactly [INAUDIBLE 00:03:13] and invalidated [INAUDIBLE 00:03:16].

Later, after I left [INAUDIBLE 00:03:22] research institute, I ventured into clinical neuropsychology and found myself something like an accidental tourist. And one of the first responses I had was I found it very difficult to see the functions of attention concentration [INAUDIBLE 00:03:38] my patients. Even the simplest of those seemed to elude me. For instance, at first [INAUDIBLE 00:03:47] have so much difficulty on focusing on questions during clinical interviews, they had to be repeated several times. Memory seems like a solid concept, yet depressed patients are notoriously forgetful. [INAUDIBLE 00:04:05] I saw would suggest that he had dementia of the Alzheimer's type. He was having a terrible time [INAUDIBLE 00:04:11], forgetting everything, and extremely worried. As we proceeded through some tests of memory, it turned out that he did better when the test became more challenging. Was he actually forgetting things [INAUDIBLE 00:04:26]? Yes, I think he was. Was he depressed? Very probably. Is depression due to memory loss different than [INAUDIBLE 00:04:34] due to memory loss? I don't know. Maybe. Recent data suggests that severely depressed elderly persons [INAUDIBLE 00:04:42] brain abnormalities in MRI scans as those suffering senile dementia. [INAUDIBLE 00:04:48]. Neuropsychological function [INAUDIBLE 00:04:53] insidiously misleading [INAUDIBLE 00:04:56] it may prevent a close look at the data or limit what we see. [INAUDIBLE 00:05:03] contributed to philosophy the idea of the

categorical imperative. This means that when we survey the world using categorical labels, we see things that fit those labels, and only those things. Neuropsychological functions may be operating as categorical imperatives at this time. [INAUDIBLE 00:05:27] addressed this issue head on in his 1990 article in the American Psychologist* [INAUDIBLE 00:05:35] correlation referring to intercorrelation [INAUDIBLE 00:05:39]. This [INAUDIBLE 00:05:41] to support another widely-held belief [INAUDIBLE 00:05:45] many neuropsychology [INAUDIBLE 00:05:48]. Namely, the belief that the different individual [INAUDIBLE 00:05:52] WMSR, and HRB validly affect brain area-related clear-cut functional differences in cognition-specific intellectual [INAUDIBLE 00:06:04 - 00:06:08] and other so-called discrete and highly differentiated neuropsychological functions. [INAUDIBLE 00:06:16] such tests is primarily a measure of a common general cognitive attribute [INAUDIBLE 00:06:26]. Consequently, clinical neuropsychologist [INAUDIBLE 00:06:34] would describe [INAUDIBLE 00:06:36] intelligence in terms of function are unaware of clinically highly relevant implications of data such as he has described.

In Minnesota, notions like functions, neuropsychological functions were labeled hypothetical constructs. In the early days of learning theory, hypothetical constructs were created with [INAUDIBLE 00:07:05] responses that could not clearly be linked to stimulus changes [INAUDIBLE 00:07:10 - 00:07:15]. Intervening [INAUDIBLE 00:07:18], on the other hand, were [INAUDIBLE 00:07:20] which summarized or acted as shorthand ways of talking about lawful relationships between stimulus [INAUDIBLE 00:07:27]. It's my suggestion here that in neuropsychology today, functions operate like hypothetical constructs to bridge the gap between brain changes and behavior changes. At this point in history, it seems to me that we can use behavioral and biological probes to better define intervening variables--or what might be loosely called clusters of traits--that will give us a more valid and more reliable and more fruitful way of looking at brain-behavior interaction. Neuropsychological function [INAUDIBLE 00:08:01]. There is an ongoing [INAUDIBLE 00:08:05] of information about brain changes from CAT scans, [INAUDIBLE 00:08:09] MRIs, and so forth, and substantial new data from neuropsychology, which would seem to [INAUDIBLE 00:08:15] to establish cleaner, more direct statements about brain behavior.

If we abandon traditional talk of functions in neuropsychology, what are we left with? I would suggest that we look at our [INAUDIBLE 00:08:29] of tests as probes -- nothing more and nothing less, and I would like to see added to the probes more [INAUDIBLE 00:08:38], such as Lykkens's emergenic trait. Emergenic traits are those in which interclass correlation of [INAUDIBLE 00:08:47] is substantially greater than [INAUDIBLE 00:08:49] correlation. They are traits that may be genetic but not familial. They include things like extroversion, electrodermal fluctuation, and interest in arts and crafts. They may be genetically based [INAUDIBLE 00:09:06] significant psychological and neuropsychological traits. One could imagine an interesting cluster of traits that might exist, for example, for diagnosed bipolar patients with UBOs--unidentified bright objects--in their CAT scan, creative interests, arts and crafts background, and [INAUDIBLE 00:09:29] that they have attention deficit disorder. Depression might be another part of that [INAUDIBLE 00:09:35].

Listening to Sperry suggest [INAUDIBLE 00:09:39] more observational and experimental approach to neuropsychological assessments, and especially to avoid looking at the patient through the categorical lenses of labeled function, which may distort our vision. What I learned from Sperry was far more than right-brained, left-brained [INAUDIBLE 00:09:58] corpus callosum. It had to do with the design of experimental approach that would clearly and unequivocally eliminate...illuminate the brain-behavior relationship. I think that there are ways in which we can approximate that idea of neuropsychological [INAUDIBLE 00:10:13] and from that basis generate concepts that are closer in kind to intervening variables -- that is, that are summary concepts for lawful brain-behavior relationships. It is hoped that these concepts will [INAUDIBLE 00:10:29].

[Applause]

And then I'd like all my speakers to come back, and we have lots of time for questions now [INAUDIBLE 00:10:45]. Evelyn, would you like to... Evelyn, would you like to start by doing your [INAUDIBLE 00:10:50]?

Speaker 2 Evelyn: They're [INAUDIBLE 00:10:55]. [Laughs]

Speaker 1: Oh, they're [INAUDIBLE 00:10:57]. Okay.

Speaker 3: Maybe she can give us a quick summary of the slides.

Speaker 1: Do you want to give a summary of those slides, Evelyn?

Speaker 2 Evelyn: Okay.

Speaker 1: Okay. And would the other speakers like to come back in front so that we can remember who you are and ask you [INAUDIBLE 00:11:16] questions.

Speaker 2 Evelyn: In my presentation, I had two conclusions. One is serial reversal learning. The learning and performance with both hemispheres is better than that with no one. The other is [INAUDIBLE 00:11:38] is better with the left hemisphere than with the right hemisphere. So, the question I think I hear is [INAUDIBLE 00:11:51]. The conclusion: Learning with both hemispheres is better than learning with either one based on different patients, and patient [INAUDIBLE 00:12:03], who always performed better than the others. So, this way, I want to make two clarifications. One is the differences do not show up in the first [INAUDIBLE 00:12:14]. The difference only show up in the reversal learning. So, I think the [INAUDIBLE 00:12:20 - 00:12:28]. Also, I did a follow-up study six months later [INAUDIBLE 00:12:32 - 00:12:36] learning with two hemispheres versus learning with one. The way to do it is [INAUDIBLE 00:12:41] one session first [INAUDIBLE 00:12:43] to the left and right hemisphere in separate [INAUDIBLE 00:12:46] with vision, and then without vision. So, with vision you have two things. One is the informational transfer; other is you add another cue. With the control patient, the added visual cues do not render improved performance in such a simple [INAUDIBLE 00:13:07]. In the [INAUDIBLE 00:13:09]--

Speaker 4: Excuse me. What's the task again?

Speaker 2 Evelyn: Okay. Behind the [INAUDIBLE 00:13:13] conditional [INAUDIBLE 00:13:15]. The task is serial reversal learning.

Speaker 4: So, the second one... Even this one, too?

Speaker 2 Evelyn: Yeah. The same... Yeah. But I added [INAUDIBLE 00:13:25] two hemispheres is to allow them to see what they're doing. So, the visual information [INAUDIBLE 00:13:33]. Then, for the [INAUDIBLE 00:13:35] and only allow the [INAUDIBLE 00:13:38 - 00:13:41] send a series of controls. With the controls added [INAUDIBLE 00:13:46] do not include the vision [INAUDIBLE 00:13:49]. With the fifth patient... Again, with the vision, performance is high. Without vision, performance drops significantly and the left hemisphere does a little bit better than the right. And I can show you the data if anyone's interested.

Speaker 4: I have a question for Harold. I mean, so... Okay, so you don't find a correlation between dichotic listening and your tasks. That's not surprising, as you say. But isn't it surprising that one doesn't find a correlation between a lateralized version of your task and a non-lateralized version of your task? Say, the spatial rotation task or the dot localization task. In fact, one--

Speaker 5 Harold: I don't understand the question.

Speaker 4: The question is--

Speaker 5 Harold: You certainly will expect to find... I guess the lateralization version of it [INAUDIBLE 00:14:45] in a normal individual, I guess you're talking about... If you somehow can do a serial test in one hemisphere...

Speaker 4: No. Let's take your dot localization task. Some individuals will do better than others. Are those who do better than others, those who will show a greater visual advantage when you use a lateralized version? And the answer seems to be no.

Speaker 5 Harold: Correct.

Speaker 4: Isn't that a problem?

Speaker 5 Harold: Why?

Speaker 4: Because you said it's a right hemisphere task.

Speaker 5 Harold: Right.

Speaker 4: So, shouldn't you do better in the left visual field than in the right?

Speaker 5 Harold: Better... Again, everything is relative, right? So, it's better on visual...better on that if they do well on that task, per se? Is that what you're saying?

Speaker 4: Yes. Yes.

Speaker 5 Harold: Sure. Again, I don't know why--

Speaker 4: If you say it's a right hemisphere task--

Speaker 5 Harold: In terms of... But why is... I guess I'm not sure of the question again. If they... Will they do better in the right hemisphere on that task?

Speaker 4: If it's a... Let's assume for a minute that the dot localization task is a right hemisphere task. Then, you find that some individuals are better than others, and you conclude--you conclude--that they have better right hemisphere performance than the others. Well, in that case, they should also show greater left visual field advantages in a lateralization version of the same task.

Speaker 5 Harold: That's what I don't understand, because you take the...you take the dot localization and you're comparing it to the world; you take the laterality test and you're comparing it to themselves, not comparing it to the world.

Speaker 4: Yeah. Okay. I'm trying...

Speaker 5 Harold: I'm sorry. I'm not sure that I... It sounds like apples and oranges. Maybe I still don't [INAUDIBLE 00:16:12]. [INAUDIBLE 00:16:18] people don't here [INAUDIBLE 00:16:19]. But then again, like I said, the last slide [INAUDIBLE 00:16:22].

Speaker 6: [INAUDIBLE 00:16:23 - 00:16:31] affective verbal [INAUDIBLE 00:16:32] -- i.e., [INAUDIBLE 00:16:36]. And what might be [INAUDIBLE 00:16:40] is that [INAUDIBLE 00:16:42 - 00:16:54].

Speaker 7: Right. I think that the next time I'm questioning, if I get to the crux of the issue that I was trying to resolve and I did all the different attentional experiments that he was priming between the two hemispheres. The question is: Is there one kind of attention, or are there many levels at which the interaction can occur? You see in the Stroop test [INAUDIBLE 00:17:14] interaction occurs at the very late stage of processing [INAUDIBLE 00:17:18]. You're asking whether earlier stages of interaction can occur [INAUDIBLE 00:17:24]. Stroop would be

a very nice way to look at it. I don't think anybody did and that would be very nice to do. I think [INAUDIBLE 00:17:31] has some data that's relevant to the affective responses and autonomic system responses [INAUDIBLE 00:17:38] people will talk about tomorrow.

Speaker 4: I have a question for Dr. [INAUDIBLE 00:17:49]. So, I mean, when one runs an experiment on...[INAUDIBLE 00:17:54] experiment in normal subjects or the split-brain patients, one tends to tell the subject to [INAUDIBLE 00:17:59] and one hopes that the patient usually does. And when one [INAUDIBLE 00:18:04], this generally seems to be true. But you have [INAUDIBLE 00:18:07 - 00:18:11]. This is not the case. What's the [INAUDIBLE 00:18:13]?

Speaker 8: [INAUDIBLE 00:18:14 - 00:18:19]. What that means is [INAUDIBLE 00:18:21 - 00:18:41]...

Speaker 4: [INAUDIBLE 00:18:41]?

Speaker 8: [INAUDIBLE 00:18:42 - 00:18:56].

Speaker 4: Do they tend to move within the narrow range? So, if we move skill further away, we will be okay?

Speaker 8: [INAUDIBLE 00:19:03 - 00:20:06].

Speaker 1: Thank you all for coming.