Lesson Plan: Man Who Mistook His Wife For A Hat

**General Description**
Students will become familiar with the human brain by analyzing neuropathological case histories. Students read a short excerpt, use their text as a resource to help identify the brain region involved. Frequently, several brain areas are involved in regulating a specific function; students must deliberate with team members during their determination of a potential brain region.

**Objectives**
1. Students will familiarize themselves with the structure and function of parts of the human brain.
2. Students will use their text and their team to identify a most probable answer when multiple possibilities exist.
3. Students will design a small experiment to determine if their hypothesis is correct.
4. Students will identify evidence which supports their hypotheses.

**Concepts**
1. The brain is an organ that has both discrete regions as well as integrates functions across several brain areas.
2. The sources of pathologies are often not easily identifiable.
3. In science, statements are supported with evidence.

**Time:**
50 minutes (possibly more depending on the amount of student discussion)

**Prerequisite Skills**
No prerequisite skills required.

**Materials**
Students need their textbooks to complete the activity.
UTI Instructions: Man Who Mistook His Wife For A Hat

**Introduction:**
Students will become familiar with the human brain by analyzing neuropathological case histories. Students read a short excerpt, use their text as a resource to help identify the brain region involved. Frequently, several brain areas are involved in regulating a specific function; students must deliberate with team members during their determination of a potential brain region.

**Procedure:**
The purpose of this activity is to allow students to learn a little bit about the human brain. It is designed in a way that students need not have any previous experience with the brain or nervous system, but they will absolutely need their texts in order to complete the activity. All students should be reminded prior to the discussion section to bring their texts, but at least some will always forget. Thus, when assembling groups, be sure at least one student in each group has a text.

Remind students to use their text and that you do not have correct answers to give them. Wander through the room as students work and listen to students questions. Instead of trying to answer their questions directly, see if you can help the student instead by directing them to pages in their text or to paragraphs in the excerpts.

Whenever you feel it is appropriate, collect student attention and have groups share answers. This can be done periodically throughout the class or at the end. Either way, be sure students not only share their answers, but the evidence and logic they used in their decision process.

Collect student handouts at the end of class.
Pre-Activity Worksheet: The Man Who Mistook His Wife For A Hat

General Description
In the activity you will do this week during your learning/discussion group, you will be examining various brain disorders. In order to be prepared for this activity, complete this worksheet.

Reading
Browse the “Nervous Systems” chapter in your text. Pay particular attention to figures 48.1, 48.3, 48.16 through 48.21, 48.24, and 48.25. Read the section on Vertebrate Nervous Systems beginning on pg. 1040.

Definitions
Write a definition of the following words. Use your text, textbook glossary, and your previous knowledge to create the best definition possible. Remember to connect your definitions to neurology and the brain.

1) nerve

2) somatic nervous system

3) autonomic nervous system

4) cerebrum

5) limbic system

Questions
Answer the following questions. You will explore your answers to these questions in-depth during learning/discussion group.

1) What is the most important structure in the human brain? Defend your answer.

2) Could one survive with a highly malfunctioning sympathetic division? Describe the conditions under which one might make do with a faulty sympathetic division.

3) What is memory? Are memories necessary?

4) What parts of your brain could you do without? Which are not necessary for your survival in today’s world?
In this activity, you'll explore the different functions of the brain and how those functions sometimes go awry. You'll need your book to tackle these mind-bending neurological disorders.

The Lost Mariner

It immediately made me think of a patient of mine, the charming, intelligent, memoryless Jimmie G., who was admitted to our Home for the Aged near New York City early in 1975, with a cryptic transfer note saying, ‘Helpless, demented, confused and disoriented.’

Jimmie was a fine looking man, with a curly bush of grey hair, a healthy and handsome forty-nine-year-old. He was cheerful, friendly, and warm.

‘Hiya, Doc!’ he said. ‘Nice morning! Do I take this chair here?’ He was a genial soul, very ready to talk and to answer any questions I asked him. He told me his name and birth date, and the name of the little town in Connecticut where he was born. He described it in affectionate detail, even drew me a map. He spoke of the houses where his family had lived - he remembered their phone numbers still. He spoke of school and school days, the friends he’d had, and his special fondness for mathematics and science. He talked with enthusiasm of his days in the navy - he was seventeen, had just graduated from high school when he was drafted in 1943. With his good engineering mind he was a ‘natural’ for radio and electronics, and after a crash course in Texas found himself assistant radio operator on a submarine. He remembered the names of various submarines on which he had served, their missions, where they were stationed, the names of his shipmates. He remembered Morse code, and was still fluent in Morse tapping and touch-typing.

A full and interesting early life, remembered vividly, in detail, with affection. But there, for some reason, his reminiscences stopped. He recalled, and almost relived, his war days and service, the end of the war, and his thoughts of the future. He had come to love the navy, thought he might stay in it. But with the GI Bill, and support, he felt he might do best to go to college. His older brother was in accountancy school and engaged to a girl, a ‘real beauty’, from Oregon.

With recalling, reliving, Jimmie was full of animation; he did not seem to be speaking of the past but of the present, and I was very struck by the change of tense in his recollections as he passed from his school days to his days in the navy. He had been using the past tense, but now used the present - and (it seemed to me) not just the formal or fictitious present tense of recall, but the actual present tense of immediate experience.

A sudden, improbably suspicion seized me.

‘What year is this, Mr. G.? ’ I asked, concealing my perplexity under a casual manner.

‘Forty-five, man. What do you mean?’ He went on, ‘We’ve won the war, FDR’s dead, Truman’s at the helm. There are great times ahead.’

‘And you, Jimmie, how old would you be?’

Oddly, uncertainly, he hesitated a moment, as if engaged in calculation.

‘Why, I guess I’m nineteen, Doc. I’ll be twenty next birthday.’

Looking at the grey-haired man before me, I had an impulse for which I have never forgiven myself - it was, or would have been, the height of cruelty had there been any possibility of Jimmie’s remembering it.

‘Here,’ I said, and thrust a mirror toward him. ‘Look in the mirror and tell me what you see. Is that a nineteen-year-old looking out from the mirror?’

He suddenly turned ashen and gripped the sides of the chair. ‘Jesus Christ,’ he whispered. ‘Christ, what’s going on? What’s happened to me? Is this a nightmare? Am I crazy? Is this a joke?’ - and he became frantic, panicked.

‘It’s okay, Jimmie,’ I said soothingly. ‘It’s just a mistake. Nothing to worry about. Hey!’ I took him to the window. ‘Isn’t this a lovely spring day. See the kids there playing baseball?’ He regained his colour and started to smile, and I stole away, taking the hateful mirror with me.

Two minutes later I re-entered the room. Jimmie was still standing by the window, gazing with pleasure at the kids playing baseball below. He wheeled around as I opened the door, and his voice assumed a cheery expression.

‘Hiya, Doc!’ he said. ‘Nice morning! You want to talk to me - do I take this chair here?’ There was no sign of recognition on his frank, open face.

‘Haven’t we met before, Mr. G.? ’ I asked casually.

‘No, I can’t say we have. Quite a beard you got there. I wouldn’t forget you, Doc!’
The Disembodied Lady

Christina was a strapping young woman of twenty-seven, given to hockey and riding, self-assured, robust, in body and mind. She had two young children, and worked as a computer programmer at home. She was intelligent and cultivated, fond of the ballet, and of the Lakeland poets (but not, I would think, of Wittgenstein). She had an active, full life—had scarcely known a day’s illness. Somewhat to her surprise, after an attack of abdominal pain, she was found to have gallstones, and removal of the gallbladder was advised.

The day before surgery Christina, not usually given to fancies or dreams, had a disturbing dream of peculiar intensity. She was swaying wildly, in her dream, very unsteady on her feet, could hardly feel the ground beneath her, could hardly feel anything in her hands, found them flailing to and fro, kept dropping whatever she picked up.

She was distressed by this dream. (‘I never had one like it,” she said. ‘I can't get it out of my mind.’) —so distressed that we requested an opinion from the psychiatrist. ‘Pre-operative anxiety,’ he said. ‘Quite natural, we see it all the time.’

But later that day the dream came true. Christina did find herself very unsteady on her feet, with awkward flailing movements, and dropping things from her hands.

The psychiatrist was again called—he seemed vexed at the call, but also, momentarily, uncertain and bewildered. ‘Anxiety hysteria,’ he now snapped, in a dismissive tone. ‘Typical conversion symptoms—you see them all the while.’

But the day of surgery Christina was still worse. Standing was impossible —unless she looked down at her feet. She could hold nothing in her hands, and they ‘wandered’ —unless she kept an eye on them. When she reached out for something, or tried to feed herself, her hands would miss, or overshoot wildly, as if some essential control or coordination was gone.

She could scarcely even sit up —her body ‘gave way’. Her face was oddly expressionless and slack, her jaw fell open, even her vocal posture was gone.

Do you think Christina is suffering from anxiety or that she has a real neurological problem? What evidence supports your answer?

If Christina has a true neurological disorder, do you think it is in her brain or in her nerves? Is there any information in the excerpt that makes you think so?

Design a quick test doctors could perform to determine if her nerves are really damaged or if she is simply nervous.

If her brain is damaged, do you think her motor cortex or her cerebellum is the likely culprit? Copy the words directly from your text that make you think so.
On the Level

It is now nine years since I met Mr. MacGregor, in the neurology clinic of St. Dunstan’s, an old-people’s home where I once worked, but I remember him - I see him - as if it were yesterday.

'What's the problem?' I asked, as he tilted in. 'Problem? No problem - none that I know of...But others keep telling me I lean to the side: "You’re like the Leaning Tower of Pisa," they say. "A bit more tilt, and you'll topple right over."

'But you don't feel any tilt?'

'I feel fine. I don't know what they mean. How could I be tilted without knowing I was?'

'It sounds a queer business,' I agreed. 'Let's have a look. I'd like you to stand and take a little stroll - just from here to that wall and back. I want to see for myself, and I want you to see too. We'll take a videotape of you walking and play it back.'

'Suits me, Doc,' he said, and, after a couple of lunges, stood up. What a fine old chap, I though. Ninety-three - and he doesn't look a day past seventy. Alert, bright as a button. Good for a hundred. And strong as a coal-heaver, even if he does have Parkinson’s disease. He was walking, now, confidently, swiftly, but canted over, improbably, a good twenty degrees, his center of gravity way off to the left, maintaining his balance by the narrowest possible margin.

'There!' he said with a pleased smile. 'See! No problems - I walked straight as a die.'

'Did you indeed, Mr. MacGregor?' I asked. 'I want you to judge for yourself.'

I rewound the tape and played it back. He was profoundly shocked when he saw himself on the screen. His eyes bulged, his jaw dropped, and he muttered, 'I'll be damned! ' And then, 'They're right, I am over to one side. I see it here clear enough, but I've no sense of it. I don't feel it.'

'That’s it,' I said. ‘That’s the heart of the problem.’

Given Mr. MacGregor’s age, which do you think is a more concerning problem, that he walks to the side or that he can’t tell that he does? Your team must first come up with at least two reasons for each possibility before making your decision. Write your decision below, including the two most persuasive arguments that made you decide so.

Your book does not specifically describe Mr. MacGregor’s problem, but it does describe brain regions that might be involved. Identify at least three regions of Mr. MacGregor’s brain that could be damaged.

Choose one brain region from your answer above and list the other functions that part of the brain performs.

If the brain region you chose in the question above is actually damaged, how is it possible that the only problem Mr. MacGregor seems to have is that he walks tilted, when that part of the brain controls so many other functions as well? Solicit possibilities from your team members, and list four of them below.
The Man Who Mistook His Wife for a Hat

Dr. P. was a musician of distinction, well-known for many years as a singer, and then, at the local School of Music, as a teacher. It was here, in relation to his students, that certain strange problems were first observed. Sometimes a student would present himself, and Dr. P. would not recognize his face. The moment the student spoke, he would be recognized by his voice. Such incidents multiplied, causing embarrassment, perplexity, fear – and, sometimes, comedy. For not only did Dr. P. increasingly fail to see faces, but he saw faces when there were no faces to see: genially, Magoo-like, when in the street he might pat the heads of water hydrants and parking meters, taking these to be the heads of children; he would amiably address carved knobs on the furniture and be astounded when they did not reply. At first these odd mistakes were laughed off as jokes, not least by Dr. P. himself. Had he not always had a quirky sense of humour and been given to Zen-like paradoxes and jests? His musical powers were as dazzling as ever; he did not feel ill - he had never felt better; and the mistakes were so ludicrous – and so ingenious – that they could hardly be serious or betoken anything serious.

‘What seems to be the matter?’ I asked him at length.

‘Nothing that I know of,’ he replied with a smile, ‘but people seem to think there’s something wrong with my eyes.’

‘But you don’t recognize and visual problems?’

‘No, not directly, but I occasionally make mistakes.’

I left the room briefly to talk to his wife. When I came back, Dr. P. was sitting placidly by the window, attentive, listening rather than looking out. ‘Traffic,’ he said, ‘street sounds, distant trains—they make a sort of symphony, do they not? You know Honegger’s Pacific 234?’

What a lovely man, I thought to myself. How can there be anything seriously the matter? Would he permit me to examine him?

‘Yes, of course, Dr. Sacks.’

I stilled my disquiet, his perhaps, too, in the soothing routine of a neurological exam – muscle strength, coordination, reflexes, tone…It was while examining his reflexes – a trifle abnormal on the left side – that the first bizarre experience occurred. I had taken off his left shoe and scratched the sole of his foot with a key – a frivolous-seeming but essential test of a reflex - and then, excusing myself to screw my ophthalmoscope together, left him to put on the shoe himself. To my surprise, a minute later, he had not done this.

‘Can I help?’ I asked.

‘Help what? Help whom?’

‘Help you put on your shoe.’

‘Ach,’ he said, ‘I had forgotten the shoe,’ adding sotto voce, ‘The shoe? The shoe?’ He seemed baffled.

‘Your shoe,’ I repeated. ‘Perhaps you’d put it on.’

He continued to look downwards, though not at the shoe, with an intense but misplaced concentration. Finally his gaze settled on his foot: ‘That is my shoe, yes?’

Did I mis-hear? Did he mis-see?

‘My eyes,’ he explained, and put a hand to his foot. ‘This is my shoe, no?’

‘No, it is not. That is your foot. There is your shoe.’

‘Ah! I thought that was my foot.’

Was he joking? Was he mad? Was he blind? If this was one of his ‘strange mistakes’, it was the strangest mistake I had ever come across.

I helped him on with his shoe (his foot), to avoid further complication. Dr. P. himself seemed untroubled, indifferent, maybe amused. I resumed my examination. His visual acuity was good; he had no difficulty seeing a pin on the floor, though sometimes he missed it if it was placed to his left.

He saw all right, but what did he see? I opened out a copy of the National Geographic Magazine and asked him to describe some pictures in it.

His responses here were very curious. His eyes would dart from one thing to another, picking up tiny features, individual features, as they had done with my face. A striking brightness, a colour, a shape, would arrest his attention and elicit comment – but in no case did he get the scene-as-a-whole. He failed to see the whole, seeing only details, which he spotted like blips on a radar screen. He never entered into relation with the picture as a whole – never faced, so to speak, its physiognomy. He had no sense whatever of a landscape or scene.

I showed him the cover, an unbroken expanse of Sahara dunes.

‘What do you see here?’ I asked.

‘I see a river,’ he said. ‘And a little guest-house with its terrace on the water. People are dining out on the terrace. I see coloured parasols here and there.’ He was looking, if it was ‘looking’, right off the cover into mid-air and confabulating nonexistent features, as if the absence of features in the actual picture had driven him to imagine the river and the terrace and the coloured parasols.

I must have looked aghast, but he seemed to think he had done rather well. There was a hint of a smile on his face. He also appeared to have decided that the examination was over and started to look around for his hat. He reached out his hand and took hold of his wife’s head, tried to lift it off, to put it on. He had apparently mistaken his wife for a hat! His wife looked as if she was used to such things.
Use your text to help you differentiate between sensory and motor divisions. Write your definitions below. (Your definition should not only include the direction of travel, but also what kind of information these systems and neurons carry.)

Is Dr.P.’s problem sensory or motor? Why do you think so?

Is Dr. P.’s problem in his eyes or in his brain? Cite any evidence from the excerpt that makes you think so.

Later in the story we learn that Dr. P. is not demented or senile, but that a portion of his cerebral cortex is damaged. Which lobe of his brain has been damaged?

Given that Dr. P. has lost the use of this visual cortex, do you suppose his other sensory cortex areas have compensated? What lines from your text suggest this is possible?
Demonstrate your new understanding of neurology and the human brain by answering this question: Given what you have learned from the stories you read today, how much of a brain is required for human life? Defend your answer in four or five sentences.