Robert Temple on how Ravel's brain was the key to a new discovery

Songs without words

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A SPECIAL neural network in the brain which is especially devoted to music has been discovered by scientists at McGill University in Canada. It "does its own thing" and runs side-by-side with a separate network for language functions, but they don't overlap.

The scientists, led by Professor Justine Sergent, initially had trouble studying this problem "because of the rarity of brain-damaged musicians". But they were able to study old accounts of the case of the composer Maurice Ravel, who died in 1937 in Paris.

In 1932, Ravel had a car accident which precipitated serious brain trouble, and his death followed an unsuccessful operation on a brain tumour five years later. A medical report in 1948 described his condition as Wernicke's aphasia (sensory aphasia), or inability to understand words; in his case, written words. He could not name or recognise musical notes which were written down.

Prof Sergent, having gone over the case, evidently has doubts about the diagnosis and now describes Ravel's trouble as "a progressive cerebral disease of unknown origin". His first symptom was loss of ability to read or write, and ideomotor apraxia ("loss of ability to willfully perform acts"). However, the intriguing thing was that Ravel could still play the piano and compose for about a year in the beginning, and until his death could still play scales and appreciate musical performance.

According to TA Sears, a British professor of neurophysiology who studied the case in the 1970s, "Given the first few notes of a composition of his own that he knew by heart, he could still sing several of his works or could play them well on the piano." This indicated a separation between some musical abilities and language abilities.

In order to explore the matter further, Professor Sergent and her team recruited 10 healthy pianists, and had them sit beside electronic keyboards on which they could play with their right

Maurice Ravel: car crash

hands. In addition to a number of control tasks, they were asked to sight-read and play the soprano line of the fourth variation of Bach's Parsita BWW 767, which none of them had ever seen before. Complex brain scans were done during the various tasks using both positron emission tomography and magnetic resonance imaging.

Obviously, a number of brain areas concerned with skilled movement of the fingers and so forth "lit up" during all of this. But the main discovery was the first clear scanning proof of the existence of a distributed neural network throughout the brain concerned exclusively with musical activities.

One area of the brain which was only activated when the pianists were listening to the Bach which they were playing was the right superior temporal gyrus. It was not activated when they were merely listening to themselves playing scales (conclusive proof that part of the piano student's brain really shuts down when playing Czerny's exercises!)

When reading musical notation, an area of the brain called the superior pariental lobe is engaged, which is not used in language skills. "The cerebral areas used during the execution of these musical skills are therefore relatively independent from the areas used for verbal tasks, which explain why some aphasic musicians can pursue their musical activities with little disruption," says Sergent.

She adds: "Our results suggest that sight-reading and piano performance entail processing demands that are realised by a cerebral network distributed over the four cortical lobes and the cereoellum."

This goes along with the latest thinking that little is really localised in the brain; it is pathways rather than regions which "specialise", and they extend all round the place. Perhaps it all goes to show how all-pervasive music really is — "The music goes round and round, and it comes out here."