

次の英文を読んで、下記の問題に日本語で答えなさい。

The left hemisphere of the human brain controls language, perhaps our greatest mental ability. It also controls right-handedness, or the special skillfulness of the human right hand. In contrast, the right hemisphere is most important in the control of our sense of how objects relate to each other in space. Forty years ago, many scientists believed that only humans had these left or right hemisphere specializations. Other animals, it was believed, had no kind of specializations in either hemisphere.

① Those older ideas fit well with the view that people hold a special position in evolutionary development. Biologists and other scientists generally agreed that right-handedness evolved in our hominid ancestors as they learned to build and use tools, about 2.5 million years ago. Right-handedness was also thought to lead to the development of speech. Perhaps, it was said, the left hemisphere first added basic sign language to its other skilled hand actions and then changed it to speech. Or perhaps the left brain's ability to control hand action led to control of the organs relating to voice and speech. In either case, speech and language evolved from a recent natural ability to use hands for making tools. The right hemisphere, meanwhile, was thought to have evolved into a center for dealing with relations of objects in space, after the left hemisphere became specialized for right- or left-handedness.

In the past few decades, however, studies of many other animals have shown that their two brain hemispheres also have distinctive roles. Despite those findings, there is a continuing scientific belief that humans are different. Many investigators still think the specializations of the two brain hemispheres in animals are not related to the human ones, which began with our hominid ancestors.

In addition to ② this view, there is also evidence for a completely different hypothesis that is gaining support, particularly among biologists. The specialization of each hemisphere in the human brain was already present in its basic form when vertebrates emerged about 500 million years ago. It has been suggested that the more recent specializations of the brain hemispheres, including those of humans, developed from the original ones by the process of evolution proposed by Charles Darwin. This hypothesis says that the left hemisphere of the vertebrate brain was originally specialized for the control of common patterns of behavior under ordinary and familiar circumstances. In contrast, the right hemisphere, the primary place of emotions, was at first specialized for detecting and responding to unexpected stimuli in the environment.

In early vertebrates ③ such a division of functions probably got its start when one or the other hemisphere developed a tendency to take control in particular circumstances. From that simple beginning, the right hemisphere took primary control in potentially dangerous circumstances, such as detecting a harmful animal nearby, that called for a rapid reaction. Otherwise, control passed to the left hemisphere. In other words, the right hemisphere became the place of behavior influenced by the environment, or bottom-up control. The left hemisphere became the place of self-motivated behavior, sometimes called top-down control.

The processing that controls more specialized behaviors -language, making tools, relations of objects in space, facial recognition, and so on - evolved from those two basic controls.

(注) hemisphere(大脳)半球 right-handedness 右利(き)き specialization 分化

hominid ヒト科の Sign language 身ぶり言語 vertebrate 脊椎(せきつい)動物

Charles Darwin チャールズ・ダーウィン(進化論の提唱者) self-motivated 自発的な

(1) 下線部①が示す内容を具体的に説明しなさい。

(2) 下線部②が示す内容を具体的に説明しなさい。

(3) 下線部③を具体的に説明しなさい。