12.1 The Wernicke-Geschwind Model of Language

The Wernicke-Geschwind model of language was proposed in 1965. The Wernicke-Geschwind model attributes the various processes involved in language to specific areas of the left cortex—right cortical lesions rarely disrupt language. The Wernicke-Geschwind model, although incorrect in several respects, has provided a framework for the study and treatment of *aphasia* (brain-damage-produced language dysfunction).

According to the Wernicke-Geschwind model, the following seven areas of the left hemisphere mediate language-related activities: (1) The *primary auditory cortex* mediates hearing the spoken word. (2) The *primary visual cortex* mediates seeing the written word. (3) The mouth and throat area of the *primary motor cortex* mediates the motor responses of speech. (4) **Wernicke's area**, an area in the left temporal lobe just posterior to primary auditory cortex, mediates comprehension of spoken language. (5) The left **angular gyrus**, the parietal lobe gyrus located on its border with the temporal lobe, translates the image of the written word into an auditory code, and passes it on to Wernicke's area for comprehension. (6) **Broca's area**, an area of the left frontal lobe just anterior to the mouth area of the primary motor cortex, stores programs of speech production and produces speech by activating the adjacent primary motor cortex. And, finally, (7) the **arcuate fasciculus**, a major tract that connects Wernicke's area with Broca's area, enables the Wernicke comprehension center to activate speech programs in Broca's area.

According to the Wernicke-Geschwind model, this is what happens when we read aloud. The visual signal is received by primary visual cortex and is conducted to the angular gyrus of the left hemisphere, where it is translated into an auditory code and conducted to Wernicke's area for comprehension. Wernicke's area then activates, via the left arcuate fasciculus, the appropriate programs of speech in Broca's area, and these produce speech by driving the mouth area of the primary motor cortex.

Wernicke's area (VER ni keys)
The area in the superior temporal cortex of the left hemisphere just posterior to primary auditory cortex; according to the Wernicke-Geschwind model, it is the center of language comprehension.

Angular gyrus (ANG gyu lar)
The parietal-lobe gyrus that is located on its boundary with the temporal lobe; according to the Wernicke-Geschwind model, the angular gyrus of the left hemisphere translates images of written words into an auditory code.

Broca's area (BROE kahz)
The area of the left frontal cortex, just anterior to the mouth region of the primary motor cortex; according to the Wernicke-Geschwind model, it contains the motor programs for speech.

Arcuate fasciculus (AR kyu ate fa SIK yu lus)
The large tract that connects Wernicke's area with Broca's area.

Coloring notes

Color each of the four labeled Wernicke-Geschwind areas that are enclosed within dashed lines. Note the position of the other three Wernicke-Geschwind areas: primary motor, primary auditory, and primary visual areas.