Quadrant II – Transcript and Related Materials

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Notes

SENSORY AND PERCEPTUAL DEVELOPMENT

Sensation occurs when information interacts with sensory receptors —the eyes, ears, tongue, nostrils, and skin. The sensation of hearing occurs when waves of pulsating air are collected by the outer ear and transmitted through the bones of the inner ear to the auditory nerve. The sensation of vision occurs as rays of light contact the eyes, become focused on the retina, and are transmitted by the optic nerve to the visual centers of the brain.

Perception is the interpretation of what is sensed. The air waves that contact the ears might be interpreted as noise or as musical sounds. The physical energy transmitted to the retina of the eye might be interpreted as a particular color, pattern, or shape, depending on how it is perceived.

VISUAL PERCEPTION

Some important changes in visual perception with age can be traced to differences in how the eye itself functions over time. For example, changes in eye function influence how clearly we can see an object, whether we can differentiate its colors, at what distance, and in what light.

Visual Acuity: A newborn perceives a world with some order. At birth, the nerves and muscles and lens of the eye are still developing. As a result, newborns cannot see small things that are far away. The newborn's vision is estimated to be 20/240 on the well-known Snellen chart used for eye examinations, which means that a newborn can see at 20 feet only as much as a normal adult can see at 240 feet. In other words, an object 20 feet away is only as clear to the newborn as it would be if it were 240 feet away from an adult with normal vision (20/20). By 6 months of age, though, on average vision is 20/40.

Face Perception: Infants show an interest in human faces soon after birth. Infants spend more time looking at their mother's face than a stranger's face as early as 12 hours after being born. By 3 months of age, infants match voices to faces, distinguish between male and female faces, and discriminate between faces of their own ethnic group and those of other ethnic groups.

As infants develop, they change the way they gather information from the visual world, including human faces. From 3 to 9 months of age, infants gradually began focusing their attention more on the faces of the characters in the animated film and less on salient background stimuli.

Pattern Perception: Young infants can perceive certain patterns. With the help of his "looking chamber," Robert Fantz (1963) revealed that even 2- to 3-week-old infants prefer to look at patterned displays rather than nonpatterned displays. For example, they prefer to look at a normal human face rather than one with scrambled features, and they prefer to look at a bull's-eye target or black-and white stripes rather than a plain circle.

Color Vision: The infant's color vision also improves over time. By 8 weeks, and possibly as early as 4 weeks, infants can discriminate between some colors. By 4 months of age, they have color preferences that mirror those of adults in some cases, preferring saturated colors

such as royal blue over pale blue, for example. A study of 4- to 5-month-olds found that they looked longest at reddish hues and shortest at greenish hues. In part, these changes in vision reflect maturation. Experience, however, is also necessary for vision to develop normally.

Perceptual Constancy: Some perceptual accomplishments are especially intriguing because they indicate that the infant's perception goes beyond the information provided by the senses. This is the case in perceptual constancy, in which sensory stimulation is changing but perception of the physical world remains constant. If infants did not develop perceptual constancy, each time they saw an object at a different distance or in a different orientation, they would perceive it as a different object. Thus, the development of perceptual constancy allows infants to perceive their world as stable. Two types of perceptual constancy are size constancy and shape constancy.

Size constancy: is the recognition that an object remains the same even though the retinal image of the object changes as you move toward or away from the object. The farther away from us an object is, the smaller is its image on our eyes. Thus, the size of an object on the retina is not sufficient to tell us its actual size. For example, you perceive a bicycle standing right in front of you as smaller than the car parked across the street, even though the bicycle casts a larger image on your eyes than the car does. When you move away from the bicycle, you do not perceive it to be shrinking even though its image on your retinas shrinks; you perceive its size as constant.

Researchers have found that babies as young as 3 months of age show size constancy. However, at 3 months of age, this ability is not full-blown. It continues to develop until 10 or 11 years of age.

Shape constancy: is the recognition that an object remains the same shape even though its orientation to us changes. As with size constancy, researchers have found that babies as young as 3 months of age have shape constancy. Three-month-old infants, however, do not have shape constancy for irregularly shaped objects, such as tilted planes.

Perception of Occluded Objects

In the first two months of postnatal development, infants don't perceive occluded objects as complete, instead only perceiving what is visible. Beginning at about 2 months of age, infants develop the ability to perceive that occluded objects are whole.

Infants develop the ability to track briefly occluded moving objects at about 3 to 5 months of age. One study explored 5- to 9-month-old infants' ability to track moving objects that disappeared gradually behind an occluded partition, disappeared abruptly, or imploded (shrank quickly in size). In this study, the infants were more likely to accurately predict the path of the moving object when it disappeared gradually than when it disappeared abruptly or imploded.

Depth Perception

Eleanor Gibson and Richard Walk (1960) constructed in their laboratory a miniature cliff with a dropoff covered by glass. They placed infants on the edge of this visual cliff and had their mothers coax them to crawl onto the glass. Most infants would not crawl out on the glass, choosing instead to remain on the shallow side, an indication that they could perceive depth, according to Gibson and Walk. However, critics point out that the visual cliff likely is a better test of social referencing and fear of heights than depth perception. The 6- to 12-month-old infants in the visual cliff experiment had extensive visual experience.

Two- to 4-month-old infants show differences in heart rate when they are placed directly on the deep side of the visual cliff instead of on the shallow side. However, these differences might mean that young infants respond to differences in some visual characteristics of the deep and shallow cliffs, with no actual knowledge of depth. Although researchers do not know exactly how early in life infants can perceive depth, we do know that infants develop the ability to use binocular cues to discern depth by about 3 to 4 months of age.

OTHER SENSES

Hearing During the last two months of pregnancy, the fetus can hear sounds such as the mother's voice, music, and so on.

An fMRI study assessed fetal brain response to auditory stimuli, confirming that the fetus can hear at 33 to 34 weeks of gestation. The fetus can also recognize the mother's voice.

Changes in hearing take place during infancy involve perception of a sound's loudness, pitch, and localization:

• Loudness. Immediately after birth, infants cannot hear soft sounds quite as well as adults can; a stimulus must be louder to be heard by a newborn than by an adult. For example, an adult can hear a whisper from about 4 to 5 feet away, but a newborn requires that sounds be closer to a normal conversational level to be heard at that distance.

• Pitch. Infants are also less sensitive to the pitch of a sound than adults are. Pitch is the perception of the frequency of a sound. A soprano voice sounds high-pitched, a bass voice low-pitched. Infants are less sensitive to low-pitched sounds and are more likely to hear high-pitched sounds. By 2 years of age, infants have considerably improved their ability to distinguish between sounds with different pitches. A recent study revealed that by 7 months of age, infants can process simultaneous pitches when they hear voices but they are more likely to encode the higher pitched voice.

• Localization. Even newborns can determine the general location from which a sound is coming, but by 6 months of age, they are more proficient at localizing sounds or detecting their origins. Their ability to localize sounds continues to improve during the second year.

Touch and Pain: Newborns do respond to touch. A touch to the cheek produces a turning of the head; a touch to the lips produces sucking movements. Newborns can also feel pain. Circumcision is usually performed on young boys about the third day after birth. An investigation by Megan Gunnar and her colleagues (1987) found that newborn infant males cried intensely during circumcision. Circumcised infants also display amazing resiliency. Within several minutes after the surgery, they can nurse and interact in a normal manner with their mothers. And, if allowed to, the newly circumcised newborn drifts into a deep sleep, which seems to serve as a coping mechanism. For many years, doctors performed operations on newborns without anesthesia. This practice was accepted because of the dangers of anesthesia and because of the supposition that newborns did not feel pain. As

researchers demonstrated that newborns can feel pain, the practice of operating on newborns without anesthesia was challenged. Anesthesia now is used in some circumcisions.

Smell: Newborns can differentiate odors. The expressions on their faces seem to indicate that they like the way vanilla and strawberry smell but do not like the way rotten eggs and fish smell. In one investigation, 6-day-old infants who were breast fed showed a clear preference for smelling their mother's breast pad rather than a clean breast pad. However, when they were 2 days old, they did not show this preference, indicating that they require several days of experience to recognize this odor.

Taste: Sensitivity to taste is present even before birth. Newborns learn tastes prenatally through the amniotic fluid and in breast milk after birth. In one study, even at only 2 hours of age, babies made different facial expressions when they tasted sweet, sour, and bitter solutions. At about 4 months of age, infants begin to prefer salty tastes, which as newborns they had found to be aversive.

INTERMODAL PERCEPTION

Intermodal perception involves integrating information from two or more sensory modalities, such as vision and hearing. Most perception is intermodal. Newborns turn their eyes and their head toward the sound of a voice or rattle when the sound is maintained for several seconds, but the newborn can localize a sound and look at an object only in a crude way. These early forms of intermodal perception become sharpened with experience in the first year of life.

In one study, infants as young as 3 months old looked more at their mother when they heard her voice and longer at their father when they heard his voice. Thus, even young infants can coordinate visual-auditory information involving people.

In the first six months, infants have difficulty connecting sensory input from different modes, but in the second half of the first year they show an increased ability to make this connection mentally. The important ability to connect information about vision with information about touch also is evident early in infancy. Coordination of vision and touch

has been demonstrated in 2- to 3- month-olds. Thus, babies are born into the world with some innate abilities to perceive relations among sensory modalities, but their intermodal abilities improve considerably through experience. As with all aspects of development, in perceptual development, nature and nurture interact and cooperate.

References

Santrock, J.W, 2014. Child Development. 14th ed. New York: McGraw-Hill.