The transition from reflexive grasp patterns to purposeful grasp is an automatic, yet complicated process. It is difficult to determine when reflex activity no longer impacts grasp; there is not a clearly defined age or manner in which one can identify if reflexive behavior has been completely integrated. Pehoski (1992, p.1) states that the ability to use the hand “has a long developmental course,” with the hands at birth being “crude instruments.”

Motor control of the upper extremity is based on the principle of proximal and distal development. Kuypers states that “two distinct motor systems control the upper limbs; one proximal, is responsible for the control of large movements of arm and hand, the other distal, controls the subtle coordinations of hand movements” (Corbetta & Mounoud, 1990, p.191). It is thought that the proximal motor systems originate in brainstem structures, while the distal motor systems originate from cortical structures (Pehoski, 1992). Initially, a child's brainstem provides the proximal control of the upper limb to direct grasp. But as the child develops, control moves from the more basic centers of the brainstem to higher brain structures located in the cortex. The increasing role of the cortical structures provides the individualized finger control needed for precision grasping. This development progression of precise hand movements provides the neurological basis for the mass to specific pattern of development. The mass to specific pattern “indicates that less differentiated movement patterns precede discrete, highly specialized skills” (Exner, 2001, p.293). For example, the infant initially uses the whole hand (or palmar grasp) to pick up a block, which indicates that the infant has not gained the precise motor control necessary to use specialized hand skills, such as in a neat pincer grasp.

In addition to the neurological maturation that occurs as hand skills develop, many other factors must work together for optimal hand function. For example, postural control, motor planning, eye-hand coordination, tactile and proprioceptive input, and somatosensory processing also play a role in the development of a mature grasp. The maturation of grasp also depends on the underlying structures of the hand, such as the musculature, muscle tone, stability of the arches, and separation of the two sides of the hand. Therefore, when using this guide, one should be aware of the numerous factors that contribute to the developmental process.

The following chapter presents the typical developmental sequence of purposeful grasp (Table 4-1). The maturation of grasp should be considered a progression with overlapping sequences (Conner, Williamson, & Siepp, 1978). In other words, children do not typically master a new type of grasp and use it exclusively; experimentation and practice are common. Additionally, the ages presented here are approximate. Therefore, this progression should be used as a general guideline, taking into consideration the individuality of each child (Table 4-2).