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## Primitive Reflexes That Influence Grasp

*The normal child changes and modifies the sensorimotor patterns of early primitive movements and adapts them gradually to more complex functions as prehension.*

—Fiorentino, 1973, p. 8

Primitive reflexes that influence grasp are described as interlacing, involuntary, and patterned movements mediated at the brain stem (Sohn, Ahn, & Lee, 2011). These reflexes are interconnected to sensation and lay the foundation for higher levels of brain development. They can be elicited by sensory stimulation generated by a particular head or body position (Fiorentino, 1981), or by tactile and proprioceptive input (Case-Smith, 1995). Primitive reflexes that influence grasp are present as early as 11 to 25 weeks gestation, with the advent of the palmar grasp reflex and the asymmetrical tonic neck reflex (Goddard, 2005; Sparling, Van Tol, & Chescheir, 1999). Others are present at birth and become more difficult to evoke as voluntary hand grasp emerges during the first 6 to 12 months (Allen & Capute, 1986; Blasco, 1994; McPhillips & Jordan-Black, 2007). Additionally, the reflexes that appear to have a connection with grasp emerge in a fairly orderly fashion in a typically developing infant, which provides a means of assessment of the maturation of the infant and for the presence of acquired or congenital neurological delays (Twitchell, 1965b). These primitive reflexes are necessary for grasping movement during fetal and neonatal development. They contribute to survival and are indicative of the neurological integrity of infants and adults (McPhillips & Jordan-Black, 2007).

Research from the 1930s and 1940s has formed our understanding of reflex activity, but with current technology affording the opportunity to explore them in exciting new ways, our traditional understanding of reflexes has come into question. These early researchers concluded that young infants are capable of only reflexive movement (VanSant, 1994). Additionally, it was believed that early

reflexes were “integrated, modified, and incorporated into more complex patterns in order to form the background for normal, voluntary movement and skills” (Fiorentino, 1981, p. ix). However, in recent years, research has indicated that the fetus demonstrates the ability to move spontaneously throughout the fetal period before the reflexes emerge, questioning the validity of the assumption that the reflex is the basic unit of motor behavior and is a precursor of spontaneous movement (VanSant, 1994). Neonates are active, not passive, organisms. Research has indicated that general movement patterns are a more accurate assessment of neurological profile than reflexes, which are “poor indicators of brain function and dysfunction” (Einspieler & Prechtel, 2005, p. 61). Regardless of whether reflexes do or do not provide the background for volitional movement, it appears that early reflexes and purposeful grasp are related.

Clinical evidence indicates if certain reflexes fail to develop, purposeful prehension will be adversely affected. Similarly, if certain reflexes emerge, but become obligatory or do not integrate, prehension will be impaired (Twitchell, 1970). Ammon and Etzel (1977, p. 13) indicate that “even mild clumsiness in manipulation indicates a degree of disequilibrium in the development of the hand reflexes.” In addition, Twitchell (1970, p. 34) states that “when none of the grasping automatism develop, prehension is impossible.” This illustrates the strength of the interrelationship between reflexes and prehension.

For these reasons, knowledge of expected reflex maturation is essential to understand the occurrence of deficits in reach and grasp (Ammon & Etzel, 1977). When difficulty with the development of grasp is observed, the reflexes