

Infant Communication: A New Understanding

Yue Liu^{1,a,*}

¹Software Engineer, Chengdu University of Technology, Erxianqiao Street, Sichuan, China

a. liu.yue2@student.zy.cdut.edu.cn

*corresponding author

Abstract: From the perspective of communication theory, this paper summarizes two common types of communication: verbal and non-verbal forms, and explains the relationship between nonverbal communication and nonlinguistic communication, followed by a discussion of the definition of verbal communication, physiological mechanisms, acquisition theory and stages of development during infancy, as well as definition and theory of non-verbal communication, and common types during infancy. At the same time, from the perspective of influence on infants, the multimodal forms composed of the attributes of verbal and non-verbal forms and the related factors surrounding infants are discussed, which include the interplay of verbal and non-verbal interactions and the integration between different types of non-verbal behavior, as well as the physiological and environmental factors that influence infants' communication development. Finally, the complexity and importance of communication development in infants are summarized and propose a referable development direction for more in-depth research into the use of science for properties that are only theoretical.

Keywords: Infant Communication, Verbal Communication, Nonverbal Communication.

1. Introduction

Different from the early pedology and medical definitions of infancy, in recent years, an increasing number of researchers have identified infancy as a period from 0 to 3 years. This movement has been reflected since the 1980s, especially taking the “Handbook of Infant Development” and “Child Development and Personality” as examples [1]. In addition, Infants are also defined as children aged 0-3 years in the “Dictionary of Psychology” and “History of Child Psychology” edited by Chinese scholars [2]. At the same time, Chinese scholar Meng defined infancy as 0-2 to 3 years old through a comprehensive investigation of the development transition period of the psychological structure subsystem in 8 aspects [1]. Therefore, this paper defines the infancy as 0-3 years according to the current situation. Communication is the most basic form of human behavior to transmit information and interact with each other, and it is also the most common social behavior with group characteristics [3], so it has always received a lot of attention, and infant communication is an important area of research in infant psychology, which plays a crucial role in human development throughout life. In this paper, communication will be classified in terms of the current state of infants' communication ability, so it will mainly discuss verbal communication and non-verbal communication.

2. Types of Communication

2.1. Verbal Communication

Verbal communication has different concepts in different fields and it cannot be generalized by one definition, so after referring to the “Dictionary of Management”, the article summarized it as the communication between individuals or groups using verbal symbols as a vehicle.

2.1.1. Language and Speech

Language is a system of symbols consisting of phonetics, vocabulary, grammatical rules, etc., and as a tool of human communication, it is also a social phenomenon [4]. But speech is the transmission process of language, which is more akin to an activity. In psychology, speech is generally divided into two categories: external speech and internal speech. External speech mainly refers to the speech that can be presented, such as oral speech and written speech; internal speech is more inclined to inner activities, which are often accompanied by thought activity [2]. It is generally accepted that internal speech is gradually formed based on external speech and infants mainly involve external speech.

2.1.2. Physiological Mechanisms

The production of infant speech is mainly related to the auditory system, speech organs, and brain [4]. Firstly, the development of the speech must depend on the auditory input. The followed is that the speech organs for voice, which is divided into three parts: the respiratory system, vocal system, and articulation system [5]. There are multiple parts of the brain that help each other develop speech. Especially in infancy, the brain function is constantly improving, speech can develop even if the dominant hemisphere of speech is lost, but adults will have permanent aphasia [1].

2.1.3. Development Theory

Laura divided language development theory into three major schools: Learning Acquisition Theory: the behaviorist perspective, The Nativist Perspective, and The Interactionist Perspective [3].

2.1.3.1. Learning Acquisition Theory

In Meng and Berk, the theories that emphasize acquired learning are divided into reinforcement theory and imitation theory [1, 3], and Berk called it the behaviorist perspective. In 1957, in the “Verbal Behavior” made by Skinner, pointed out operant conditioning doctrine to show that the acquisition of the speech is through the establishment of conditioned reflex and emphasized the decisive role of reinforcing stimuli immediately following verbal behavior in the formation of infant verbal behavior [1, 2]. As the earliest proposed hypothesis of language acquisition mechanism, imitation theory was put forward by Albert who advocated that infant language is acquired only through observation and imitation of adult language. Whitehurst and Vasta put forward a new viewpoint called selective imitation after examining a large number of studies in the 1960s and early 1970s and indicated that children's language learning is not a mechanical imitation of adult language [2, 6]. However, the behaviorist perspective overemphasizes the external role, ignoring the role of human internal language ability. For example, the birth of the Nicaraguan Sign language cannot be explained by acquired learning. Thus, the idea of placing too much emphasis on acquired learning cannot completely explain language acquisition.

2.1.3.2. The Nativist Perspective

In 1959, Noam Chomsky strongly criticized the reinforcement theory in his book “Syntactic Structures” and proposed the Transformational-generative grammar/innate language capacity theory [2], and LE. Berk called it the nativist perspective. Chomsky considered that language is an innate ability of human beings. In the meantime, he asserted that all humanity has a basic grammatical form—the grammatical structure, and assumed that children were born with a language processing device, called “language acquisition device, LAD” [1]. However, Chomsky’s initial remarks overemphasized the innateness of language, neglecting the social nature of language and the contribution of the acquired environment to speech development [2, 7]. Subsequently, the study of wild child Victor by Lane and the study of isolated child Genie by Curtiss both confirmed that long-term social isolation had a significant impact on language acquisition [8]. This discovery led to a further refinement of Chomsky's theory of transformational generation, adding the external conditions that language acquisition can only be obtained under certain conditions of time and exposure to language stimuli [2]. Such a conditional addition makes the study of language theory develop from the two extremes of innate and acquired language theory toward an interaction theory.

2.1.3.3. The Interactionist Perspective

In psychology, the Interactionist Perspective is generally divided into the cognitive interaction model and social interaction theory, both of which show that children's language development is the result of innate ability and acquired interaction. In the 1970s Piaget and his team advocated that cognitive structure and ability originated from the interaction between subject and object, expressing that language is a symbolic function and has a logical composition and cognitive structure is the basis of language development [2]. However, since the cognitive theory was not proposed for language acquisition, and there was not enough evidence to prove that the two are mutually constraining, this view was questioned by later scholars. The social interaction theory, advocated by Bruner, Bates, and other scholars, mainly emphasized the importance of the actual communicative function of language in the process of verbal communication. It is evidenced by the absence of interactive practice activities between children and adults in language communication and the process of discursive input in children's conversations with adults [6]. For example, the wild child Victor and the isolated child Genie were unable to develop their language as normal as ordinary people after growing up without a language environment [6,7]. On the other hand, the well-known study of adult-child conversation, “child-directed speech, CDS” and motherese as language input to children are also closely related to language acquisition [6]. However, due to the limited accumulation of research on this theory, more exploration and verification are needed to refine it.

2.1.4. Development Stage

Although various languages have different properties and structures, the developmental stages of speech all have similar structures based on age and are divided into two main stages: the prelinguistic stage (prespeech stage) and the speech stage [2]. In these two stages, different scholars have their stage divisions.

2.1.4.1. Prelinguistic Stage and Prespeech Stage

The long period of preparation for speech occurring before an infant acquires language is called the prelinguistic stage and prespeech stage, which is the period between birth and the first real word spoken, and is generally concentrated between the ages of 0 and 1 year [2, 8]. At this stage, the infant's speech perception ability, pronunciation, and comprehension ability have improved significantly, and

these advances allow the infant to string together the perception, reception, and expression of language. Speech perception in the prespeech stage mainly refers to the phonological perception of oral speech and is generally divided into three areas: auditory, phonetics, and phoneme [2]. E. Kaplan and G. Kaplan divided the development of infant speech perception into five stages. The first stage is 5-8 months of pregnancy, when the fetus forms a preliminary auditory response, showing the memory and recognition of speech; the second stage refers to the birth of infants between 0 and 1 month old, at this time the infant can distinguish the nuances of various sounds; the third stage is from February to April, the infant begins to distinguish between clear and dark consonants and to understand certain information in speech activities; the fourth stage refers to 5-9 months, the infant learns to distinguish multiple verbal information; The final stage is between September and December when the infant begins to have verbal intuition about phoneme. Regarding the pronunciation stage, they divided it into four stages, the initial pronunciation from 0-1 month - crying, the chirping cooing that occurs after the first month, the babbling after half a year of age, and standardized speech after 10 months [9]. The division of pronunciation stages is generally based on the reference from the initial crying sound to the monosyllabic sound, then to polysyllabic sounds, and finally to meaningful speech. Many studies show that infants who begin to understand adult language after 9 months can respond to language stimuli, but at this time infants' speech comprehension ability is still immature and needs to be stimulated by evoked behavior from adults [2]. Between 9 and 12 months, speech perception ability, pronunciation, and comprehension ability begin to correlate.

2.1.4.2. Speech Stage

The speech stages are usually divided into vocabulary, sentences, and grammar. As for vocabulary, the most important thing is acquisition and use, the progress in these two aspects is generally reflected in the continuous acquisition of vocabulary, the acquisition of the meaning of some words in different situations, and the acquisition of some words with general and referential functions, etc. [10].

The second is the occurrence and development of sentences, which can be divided into two stages: the word-sentences stage from one to one and a half years of age and the multi-word sentences stage after one and a half years of age [6,8]. This includes the transition between words and sentences, and the phenomenon of substituting words for sentences appears, and the infant thus begins the word-sentence stage, which is called the negative vocabulary stage by some scholars. 10-19 months is the stage when the infant's speed of mastering new words is significantly improved. At the same time, the infant's word sentences are also constantly developing, from strong situational to the use of double word sentences to communicate later, but there are still obvious defects, such as the use of sounds instead of words, multiple meanings in one word, narrowing of the lexical meaning and specialization of word meaning, and the use of overlapping sounds are common. After the transition from 20-24 months, the infant speech stage enters the multi-word stage, also known as the active speech stage. Infants begin to speak simple sentences of 3-5 words, and sentences of no more than 5-6 words at most, and their vocabulary increased greatly, and began to ask questions [8, 10].

The critical period for infants to master grammar mainly focuses on 20-30 months, and the grammar rule system is mastered at 36 months [10]. Scholars have debated how infants master a system of grammatical rules during these ten months. The more well-known ones are the semantic guidance advocated by Bowerman and Pinker, which shows that infants use knowledge of semantic relations to learn syntactic relations; Other common ones are "general grammar, UG", which Chomsky extended from the hypothesis of the language acquisition device-LAD [5], and some scholars believe that grammar formation is promoted by the continuous improvement of infants' cognition. However, due to the lack of research and hypothesis lack of strong empirical reasons, there is not yet a sufficiently developed theory to fully explain the mastery of infant grammar.

2.2. Non-verbal Communication

In social psychology, Hall pointed out that non-verbal communication is how humans communicate information about their emotions, intentions, needs, attitudes, and thoughts without reference to written as well as spoken words [11].

2.2.1. Non-verbal Communication in Infants

A previous study defined nonlinguistic communication as communication without language, that is, communication in other ways than language, and also explains the relationship that nonverbal communication contains nonlinguistic communication [12]. But, the basic processes of non-verbal communication, and how they differ from verbal or linguistic communication have not yet been fully elaborated. In general, different types of nonverbal behavior, situational context, and other situations cannot be summarized completely, so the definition of judging its state is incomplete and inaccurate, which is the current state of affairs common to research on non-verbal communication in the state of scientific rigor [13]. Therefore, in this paper, the more obvious activity expression made by infants is used as a reference, and the non-verbal communication of infants is regarded as a form of emotional expression.

2.2.2. Emotional Expression

In Meng's view, emotions are divided into internal experience and external manifestation [1]. Generally speaking, the internal experience of emotions is feeling and the external manifestation is emotional expression, and emotional expression occupies an irreplaceable position in understanding infants' communication. There are three main types of emotional expressions: facial expression, intonation expression, and emotional body language, all of which belong to body language [2, 4].

2.2.2.1. Facial Expression

The early research on expression almost focused on facial expression, which is regarded by scholars as one of the most common, important, and complex forms of nonverbal communication. Facial expression refers to the expression of various emotional states through the changes in eye muscles, facial muscles, and oral muscles [4]. Studies have found that humans can interpret an unusually large number of variations in facial structure, and that facial expressions are universal and innate in Darwin's view. From birth, infants already have the behavior of communicating with facial expressions. The most common emotions are happiness and sadness, followed by surprise, fear, anger, disgust, interest, etc. Of these, happiness and sadness are mainly expressed by smiling and crying. For example, infants will cry when they are hungry, painful, unwell, and cold, to remind adults of their discomfort, and the infant in a comfortable sleep state of the face of the smile expression of the physiological spontaneous response and so on [1]. It has also been hypothesized that facial expressions play a causal role in the experience of emotions during infancy, and this hypothesis has been verified by numerous scholars. In Olson et al., it is also stated that facial expressions can be used to identify infants' reactions to specific experiences and that the numerous emotions expressed by infants can be identified through the Maximally Descriptive Facial Movements Code proposed by Izard [14]. At the same time, in the test of Izard, when ten-week-old infants have pleasant and unpleasant communication with their mother, they will have corresponding negative or positive expressions [4], and a series of similar experiments, such as showing that parents' smiling behavior can promote children's smiling behavior [1, 15], can prove that facial expressions are a very critical communication channel for infants.

2.2.2.2. Intonation Expression

Intonation is the vocal effect of pitch on the sentence-level modification of meaning [16]. But in normal circumstances, intonation expression generally refers to the conveyance of information by changing the physical properties of speech, such as pitch, intensity, timbre, length of the tone, etc. [4], it has always been seen as a way of conveying information, and what is conveyed can be broadly divided into three categories of information. The first kind of information is about the structure and semantics of discourse. This information includes questions, statements, and other markers of speech acts, such as providing background or theme, review or embellishments, etc. The second category of information generally refers to emotions or emotional attitudes, such as a rant in an emotional outburst, and the last type of information expresses the stance of the conversation, such as a teasing tone when expressing disagreement with the other person's point of view [17]. As for the scientific nature of intonation to convey information, some scholars conducted such an experiment, selected actors who were trained to read meaningless syllables or neutral passages of text and try to use prosody, tone, and rhythm to express different emotions, and then presented these emotion-related rhythm samples to the audience. The audience selected the term that best matches the emotion conveyed in the speech output from a series of options. In the end, the study found that the audience could judge five different emotions in the rhythm accompanying the voice --anger, fear, happiness, sadness, and gentleness, and the accuracy was close to 70%. This largely proves that people can convey emotion through intonation without the distraction of words [15]. Research shows that intonation can consciously manipulate emotional markers and therefore infant-directed language such as babytalk has emerged to stimulate the development of infant speech, which generally has high-level rhythm, exaggerated intonation and slow rhythm, this type of intonation exhibits specific physical characteristics that are more attractive to infants [1]. More importantly, some experiments show that infants develop tonal features for intonation long before they can recognize words composed of consonants and vowels, and have certain speech processing and discrimination abilities. They can distinguish the voice of strangers from the voice of their mother, show their preference for the voice of their mother, and also will show the phenomenon of crying and continuous vocalization based on whether the mother is present or not [16]. In a variety of studies, the idea that the input and output of intonation are common and critical to infants has gradually become one of the classic reference conditions for studying infant psychology.

2.2.2.3. Body Posture Expression

Darwin put forward the idea that emotional expression is a multimodal pattern of behavior and said that conveying emotions in communication behaviors will have signal value, from simple hand movements to changes in body posture to head movements [15], so the emotional body language can be divided into two categories: gesture and body expression [4]. Some scholars have found that infants begin to use gestures and other non-verbal activities to initiate communication behaviors when they are in the prelinguistic development period from 8 to 10 months [8]. As a complex communicative behavior based on social cognitive skills and cooperative motivation, infant gesture is the main behavior in which infants express their intentions, and they are divided into three main categories: traditional gestures, emblematic gestures, and indicative gestures, traditional gestures refer to the gestures with form and meaning specified by culture, and emblematic gestures refer to the gestures that describe the attribute or action of an object through the action of hand or body, and some scholars have summarized these two types of gestures as declarative gestures [18]. Indicative gestures refer to gestures in which individuals stretch their arms, palms face down, index fingers are straight, and the other four fingers are naturally bent to point to things or places in space, also known as imperative gestures [8, 19]. After infants begin to speak, they often use gestures to supplement the

meaning of individual words or deepen their expression to ensure that their information can be understood [8]. Common gestures for infants include opening their arms to express their desire for a hug, clenching, or punching to indicate emotion when they are excited, etc. Studies have shown that the acquisition of gestures comes from learning, so there may be individual or group differences [4], and the acquisition and development of gestures may promote the learning development of infants in all aspects [19]. Studies have shown that body posture can also affect emotions. For example, when a person stretches, the spirit will be more excited, and the vitality will be relatively reduced when contracting [4]. Some scholars said that there is also body posture as an intermediary in the communication between infants and mothers, which can help infants promote cognitive and behavioral development. Adults often use themselves as a reference and make body gestures that are accompanied by words, so that the infant grasps the nature or purpose of the behavior in question in the process, and therefore learns to use non-verbal gestures to indicate wishes, commands, needs, etc. [1].

3. Influencing Factors

Both verbal communication and non-verbal communication are crucial to the development of infants. Their development involves many aspects. Here, their influencing factors of them will be analyzed from two perspectives: the multimodal patterns of behavior and the factors surrounding infants.

3.1. The Multimodal Patterns of Behaviors

It can be seen from the routine that human speech behaviors are usually accompanied by non-verbal behaviors to achieve better communication effects. Some scholars believe that there are both connections and differences between them, which are intertwined and complex. Moreover, the fit of information transmitted by verbal communication and nonverbal communication is complex and diverse, and the mutual influence may be manifested in the strengthening or weakening of information. For infants, the strengthening between the two is more obvious and easier to be felt by the outside world, such as "agree" accompanied by words when nodding, accompanied by verbal "disagree" when shaking his head [12], and applauding with his hands when he receives something he likes, etc., which can further emphasize the expression of infant's attitude towards things. At the same time, there is a view that the gestures of infants in the prelinguistic stage can predict their language development, and that indicative gestures and language development are closely related, and the correlation between them will become closer as infants grow older [18]. Brooks believes that the reason why deictic gestures can predict language is that deictic gestures have a bi-directional function, which helps infants acquire language by providing them with communication tools, on the other hand, they increase the caregiver's input of language to the infant by prompting the caregiver to focus on the object to which the infant is pointing [18]. Others suggest that deictic gestures may increase infants' attention and interest in target objects, contribute to the arousal state of learning and motivation to communicate and seek information, and thus promote language development [19], some scholars have also studied and come to the conclusion that speech and nonverbal interact and modify each other from the perspective of spontaneity, symbolism [13] and communication Science [20]. At the same time, emotional expression is a mostly multimodal and dynamic expression, which is to mix a variety of emotional expression types together [15]. For example, tonal expressions are inseparable from facial expressions, and they can express emotions better when they are superimposed on each other. When infants cry when they close their eyes, they will scream, and then the tone and its persistence will be adjusted according to the actions of adults. There are also experiments on this, which indicates that facial signals seem to adjust the expression to roughly the same degree or way as intonation expression to match intonation expression to a great extent, to emphasize and contrast

communication [17]. The most common occurrence in infants is that after crying and not getting attention from adults, the intonation rises and the accompanying expression changes from sadness to pain and finally to anger to gain adult attention [1], and some experiments show that intonation is the vocal counterpart of gesture, and also suggest that intonation and gesture are sister systems derived from a common pragmatic source [16]. Therefore, the behavioral interaction in the communication process is particularly important for influencing the development of communication.

3.2. The Factors surrounding the Infant

The relevant factors surrounding infants are divided into two main sections: the internal factors including the infant itself and the external factors excluding the infant itself. The internal factors including the infant itself mean that the infant itself has attributes that can have an impact, particularly in terms of physiology, such as genetics, age, growth, development and gender, etc. Physiological aspects such as sound limbs are a prerequisite for the development of motor skills, sound articulation is a prerequisite for the development of spoken language, and a well-developed brain and nervous system is a prerequisite for the development of intelligence. While genes provide the initial natural material premise of human development, they also lay the initial foundation for individual differences in infant psychological development, which lays a solid foundation for good physiological development, and age promotes the progress of physiological development, that is, the rise of physiological maturity. At the same time, the infant's psychological thinking is also developed, which involves the development of thinking and cognition. In the view of scholars, thinking and cognition are both the key to language and non-verbal development, and the premise of perception, while the infant's language ability The development of children is an extremely complex psychological cognitive process and an important part of the overall cognitive ability of children. Emotions are also generated by information processing related to cognition. Due to the gender difference, the development of men and women is different in the gene, physiological, and psychological development, which will also lead to different processes of verbal and nonverbal development in different periods. The external factors excluding the infant itself refer to the natural environment, the social environment, the family environment, the environment of childhood experiences, etc. The intrauterine environment in which the baby grows is also a natural environment, which protects the fetus physiologically and safely, and the state of the mother also affects the fetus as a natural condition. Emotions, drugs, drug addiction, alcoholism, and diseases are likely to cause physical harm to the fetus, and the good natural environment in the later stage of fetal birth is also inseparable from the psychological development of the baby, affecting the infant's emotion and cognition, etc. The social environment and family environment are mainly reflected in interpersonal and cultural differences. In Bronfenbrenner's model of the environmental system, family, parents, partners, childcare institutions, social class, social network, history, and culture permeate each other and influence and act on children. To a certain extent, these encourage the growth of children's self-awareness, the cultivation of interests and hobbies, as well as the initiative of interpersonal communication and active participation in the development process, etc., which especially require children's active cooperation in psychological development. Therefore, it can be seen that the internal and external factors of infants are inseparable, and their development is promoted by both congenital and acquired factors.

4. Conclusion

The above describes verbal communication and non-verbal communication in more detail and refers to the communication behavior with infants as the object. Although both evolved from extremely complex processes and involve multiple elements, as important links to understanding the development of infants in all aspects, these two have great research value. However, there are still

some key attributes mainly based on theory, in the modern era with the gradual development of science and technology, long-term in-depth research can be conducted on the development of infants in all aspects from the perspective of science and technology.

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