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Retraction

Retracted: The Influence of Children's Psychological Language Development Based on Computer Digital Statistics Technology

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Zhu and Y. Yang, "The Influence of Children's Psychological Language Development Based on Computer Digital Statistics Technology," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 2897440, 10 pages, 2022.

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Research Article

The Influence of Children's Psychological Language Development Based on Computer Digital Statistics Technology

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Children's psychological language development cannot be explained by the mechanism of adults learning a second language, and there are great differences between them. Children's language acquisition ability is congenital. They can obtain language information with the help of sensory organs and learn language features through brain black box processing. Therefore, studying the influence of children's psychological language development is helpful to solve the problem of human language learning and provide a reliable research basis for language education. An important research method of psycholinguistics is behavioral experiment, which can provide detailed and real research materials and data on children's language learning process, but it cannot reflect children's psychological process. In this paper, the computer digital statistical technology model is introduced into the research on the impact of children's psychological language development, combined with the dual network model of language model to simulate the psychological mechanism of children's language acquisition process. The simulation results of the model show that the acquisition of phoneme category has an important impact on children's language development. Compared with before learning, after children complete learning, the clustering and compactness of language consonant and vowel phoneme range are improved, which promotes the learning of language features.

1. Introduction

There are great differences between children's first language learning and acquired language learning. In the early stage of language learning, children are born with the ability to receive the language input of the surrounding environment, process, and learn. This ability enables them to obtain language information through various sensory organs without corresponding linguistic knowledge and explore and learn language characteristics, word relevance, semantic intonation, etc. through brain processing [1]. Long-term research on children's language development shows that their learning process is unpredictable to a certain extent. The whole language information processing process is like a black box operation, which is difficult to clearly explain the complex process, but this cannot stop people from exploring the mechanism of language development [2]. Experts and scholars believe that understanding children's language development and language information processing will solve many problems in language development. The mechanism of children's language acquisition needs to be studied in combination with various knowledge and theories, and children's psycholinguistics is the focus of research [3]. Based on this, some scholars pointed out that there is a strong correlation between children's psychological activities and behavior, and the research on the impact of their language development should be based on psychological development [4].

In the past, the research on the influence of children's psychological language development is usually carried out by behavior experiment, which is also an important research method in psychological research. Behavior experiment can record the reaction, language output process and language acquisition process of the subjects when they are stimulated by language in detail and truly and provide first-hand research data for the study of children's psychological language development, which also obtains a lot of results [5]. However, this method has limitations and cannot reflect children's internal psychological activities and internal language information processing methods and processes. The application of computer digital statistics technology provides a new research idea for the simulation analysis of children's psychological language development. Therefore, this paper introduces the self-organizing neural network model in the research on the impact of children's psychological language development and combines the language model duality network model to simulate the mechanism of children's language development and analyzes the results of the comparative experiment of children's language acquisition.

2. A Study on Psycholinguistic Development and Children's Psycholinguistic Development

Psycholinguistics originated from Vygotsky's research results and was gradually valued and applied by psychological researchers in the following decades [6]. Psycholinguistics is the theoretical basis for studying human language development and exploring the mystery of language learning. It focuses on the language development of children with communication defects. Therefore, it is widely used in the field of educational language teaching [7]. From the perspective of western psychology, the key to the development of children's language acquisition and behavior is that children's learning environment has a limited impact [8]. Other scholars put forward the opposite idea, which holds that children's innate language learning ability is only the basic condition for language acquisition, and the acquired learning and environmental influence play a greater role [9]. With the in-depth study of children's psychological language, some scholars pointed out that the acquisition of knowledge in children's early learning stage is completed through their own sensory consciousness, and the brain reorganizes and outputs the environmental difference information it feels [10]. This view has been recognized by many scholars. Some scholars put forward that the essence of learning is the process of assimilation and balance caused by environmental factors acting on learners' psychology or behavior. In this process, learners are the center of the change process [11]. In addition, some scholars pointed out that acquired learning and environmental impact are very important, but we cannot ignore people's internal subjectivity, that is, the influence of psychological development [12].

In the study of children's psychological language development methods, some scholars put forward that children's language learning is the exchange of language information, and their language acquisition process is the information processing process, which is controllable, and can be studied through children's learning a second language [13]. However, some scholars believe that children's language perception and learning ability are stronger than people's cognition, but their initial stage of language learning will still be affected by uncertain factors in the environment, and they will continue to stimulate the acquisition of differences between different sounds through language [14]. Some scholars believe that children will be affected by the distribution structure of mother tongue speech, generate magnet perception effect, and constitute categorization of mother tongue speech learning. From the perspective of children's pronunciation, some scholars have proposed that children's learning of language pronunciation has an unconscious period and will not enter the language imitation period until their corresponding organs are mature and gradually improve their perception. Then, through the continuous improvement of self-control ability, the accuracy of language pronunciation can be improved [15, 16]. In the process of children's psychological language development, expressing ideas is one of the important driving forces to promote their language learning and output. This period is also a stage for children to think independently and express their demands to a certain extent. Interactive communication has become a key factor in their language development [17]. According to the language characteristics and development law, some scholars pointed out that children's psychological language will be greatly affected by language tone and phoneme in the imitation stage, which is an important part of their language acquisition [18]. Children have a perception of the tones expressed in various languages, and the information contained in tones itself is independent in language representation, which is another form of language expansion. Children's tone learning will promote the learning of language phonemes. At the same time, with the growth of children's age, there are few errors in tone [19]. At present, many scholars have introduced the application of high and new technology in the research of children's psychological language development to study the impact of children's psychological development on language development from a more scientific, systematic, and comprehensive perspective [20]. However, this does not mean that psychological and behavioral experiments have been replaced. They complement each other. Combined with behavioral phenomena and psychological changes, they can further explain and study the process of children's language learning and development, so as to provide reliable supporting data and analysis results for further research.

3. Construction of Influence Model of Children's Psychological Language Development Based on Computer Digital Statistics Technology

3.1. An Analysis of the Process and Mechanism of Children's Acquisition of Language Knowledge. There are differences in the way children learn the first language and teenagers learn the second language. Many scholars believe that children's language learning has congenital and particularity. It is not similar to the way of second language learning and takes the words of the language as the smallest unit of learning. In the relevant research of psycholinguistics, children living in the environment of natural transmission of their mother tongue for a long time can analyze and acquire knowledge of the acquired input language through their perceptual ability and gradually understand the language content and express it. The knowledge of perceptual acquisition includes the phoneme system and collocation relationship of language and phonetic system, which can promote the brain to improve the information of language thesaurus. In turn, language vocabulary knowledge can improve children's mastery and application of phonetic system. As shown in Figure 1, it is a schematic diagram of the acquisition and acquisition of language information in the process of communication between children and teachers or parents. From the perspective of psycholinguistics, it is believed that children's natural sound perception ability can obtain and process language information, and their sensitivity to the opposition of various language phonemes is higher than that of adults. They can be distinguished without acquiring relevant knowledge. The analysis of language information in children's brain is based on the unacquainted relevant language knowledge and the uncertainty of language environment. Therefore, the phoneme scale and phonetic features in language information are clarified in a similar statistical way to understand the form and structure of phonetic distribution. In this process, the relevant phrases and words in the language information will be cut apart by the child's brain, predict the syllable structure and vocabulary range, and then output the information through the effector organ, that is, imitate the pronunciation of the language and realize the correction of language phonemes.

How the brain processes and stores language information in children's language learning is the key to understand their language acquisition mechanism. According to relevant research results, the understanding of this process can improve people's mastery of language learning and teaching and enhance the controllability of teaching. Combined with psycholinguistics and information theory, the mechanism of children's brain processing language information is similar to computer processing information technology, that is, encoding and transforming language information according to specific rules, which has become the form or state of children's psychological recognition and acceptance. The coding process is not random, but it still maintains the accuracy and effectiveness of language transmission information content. Psycholinguistics believes that this is related to the performance of children's brain to filter and process specific forms of information.

Children's language learning state changes all the time. In the study of psycholinguistic behavior, it is found that when children are 14 to 20 months old, they can distinguish familiar words from words with different phonetics, but they cannot distinguish words with similar phonetics; children aged more than 20 months can complete the identification of words with similar pronunciation. Therefore, the primary stage of children's mental language development focuses on word segmentation and vocabulary learning. Words with different pronunciation can be easily distinguished, but words with similar pronunciation are more likely to be confused. This is a stage when children are not sensitive to phonetic details. With the establishment of children's phonetic and semantic relationship information database, they will improve the processing and perception of language phonemes and enhance the ability of phonetic similarity and discrimination. It can be seen that phoneme acquisition plays an important role in children's psychological language development.

3.2. Establishment of Self-Organizing Neural Network Model and Language Pattern Duality Network Model. In the past, the research method of children's psychological language development was mainly behavioral experiment. The experimental results reflect the authenticity and intuition of language phenomena in the process of children's language acquisition, but it is difficult to show children's thinking process, perception process, memory process, and language information extraction mechanism. Simulating children's psychological language development through computer digital statistical technology can fill the shortcomings of behavioral experiment, with high efficiency and strong controllability. It shows strong theoretical and practical significance. According to the characteristics of children's psychological language, combined with self-organizing neural network model and language pattern duality network, this paper constructs a quantitative neural model. Among them, the self-organizing neural network has connection scalability; that is, after model training, it can extend from the initial node network state to the edge node and expand independently. This stage represents the initial stage of children's language learning. It needs the influence of external environmental factors and language to activate the neural network, which is the basic condition for language perception and learning of language children. At this time, the adaptive stage of integration will guide the neural network to traverse all the training data to avoid repeated coverage and training and adjust the initial node feature vector according to the data information and the best matching point. The detection principle of the best matching position is shown in

$$n = \arg\ \min_a \{\|n_a - \mathrm{BMU}_b\|\}. \quad (1)$$

In the formula, the newly added node position is represented by n, the best matching node is represented by BMU, and all the blank positions directly adjacent to it are represented by n_{BMU_1}, N_{BMU}; that is, the node sorting sequence based on the distance of eigenvector. At this stage, children have entered the period of fuzzy simulation of language, and their brain nerves are constantly stimulated and affected by language in the natural language input environment, gradually changing children's perception system.

In the growth stage, the neural network performs a single data iteration and multiple iterations to locally update the node eigenvector. The input of each new data has the learning rate and neighborhood range given the initial value. The expression of the update rule is as follows:

$$w_a(t+1) = w_a(t) + R_{\mathrm{learn}}(t)h(t)[x(t) - w_a(t)], \quad (2)$$

where $a \in N$ and w_a denote eigenvectors, R_{learn} denotes learning rate attenuation, h denotes neighborhood function,

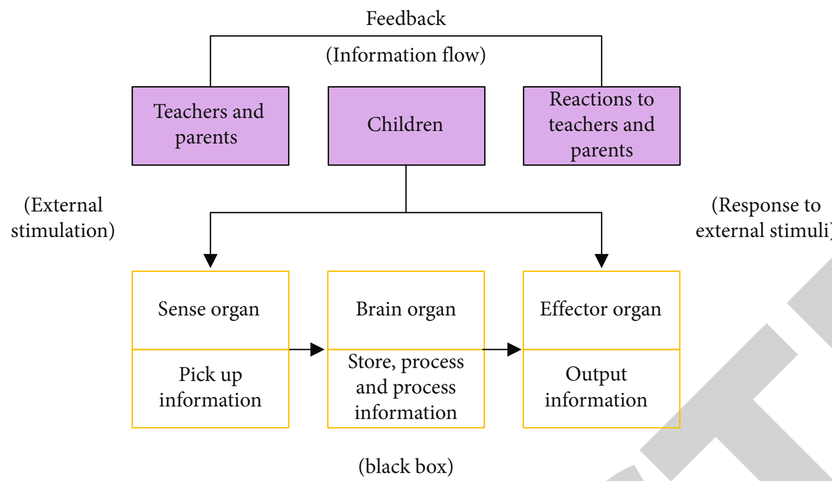

Figure 1: Schematic diagram of the acquisition and acquisition of language information in the process of communication between children and teachers or parents.

and input data eigenvectors denote x. At this stage, the stimulation range of children's brain increases, more nerve nodes gain vitality, and their learning ability is improved. The calculation of neural network learning rate is shown in

$$R_{\text{learn}}(t+1) = \lambda \times \theta(n) \times R_{\text{learn}}(t). \tag{3}$$

The attenuation parameter is expressed as λ, and the calculation formula of the number of all nodes in the current network is as follows:

$$\theta(n) = \frac{1-Q}{n(t)}, \tag{4}$$

where Q is a constant and set as $Q = 3.8$.

The initial range expression of neighborhood is shown in (5), which ensures the stability of initial growth:

$$S_{nb} = \begin{cases} \log_{10}(N), & \text{if } N > 10, \\ 1, & \text{other.} \end{cases} \tag{5}$$

The definition of Gaussian function is shown in

$$h(t) = \exp\left(-\frac{d_{ix}^2}{2S_{nb}(t)^2}\right), \tag{6}$$

where the network distance between the best node a and the node in the neighborhood range is represented by d_{ax}^2.

The accumulated part of nonedge nodes exceeding the growth limit of neural network will be transferred to adjacent nodes in the form of error distribution, which provides indirect power for network expansion. Improve the traditional distribution strategy to obtain a new strategy, as shown in

$$E_{\text{BMU}}(t+1) = \frac{E_{\text{BMU}}(t)}{2}, \tag{7}$$

$$E_{\text{nbrs}}(t+1) = E_{\text{nbrs}}(t) + \frac{1}{n_{\text{nbrs}}(t)} \times \frac{E_{\text{BMU}}(t)}{2}. \tag{8}$$

The cumulative errors before and after error distribution are expressed as E_{BMU} and E_{nbrs}, respectively, and the current node and BMU are directly adjacent, and the number is expressed as $n_{\text{nbrs}}(t)$.

The detection of learning results by the model is the test of children's depth of language understanding. The inspection process also reflects the accuracy of children's phonological and semantic relationship. The language pattern duality network training shows that there are already mapping link nodes between semantic and auditory networks. The link update and weight enhancement methods are shown in

$$\omega_l(t+1) = \omega_l(t) + L. \tag{9}$$

The mapping link forgetting rate function is

$$\Delta\omega_l = \sqrt{\frac{N_l(t) - N_l(t-1)}{N_l(t)}}, \tag{10}$$

where $N_l(t)$ represents the number of possible mapping links in the current network, and its expression is shown in

$$N_l(t) = \prod_{a=1}^{n} N_{\text{nodes}_a}(t), \tag{11}$$

where $N_{\text{nodes}_a}(t)$ represents the number of all nodes of the current a neural network.

The mapping link weight obtained after applying the forgetting strategy according to the forgetting rule is expressed as

$$\omega_l(t+1) = \omega_l(t) \times (1 - \Delta\omega_l). \tag{12}$$

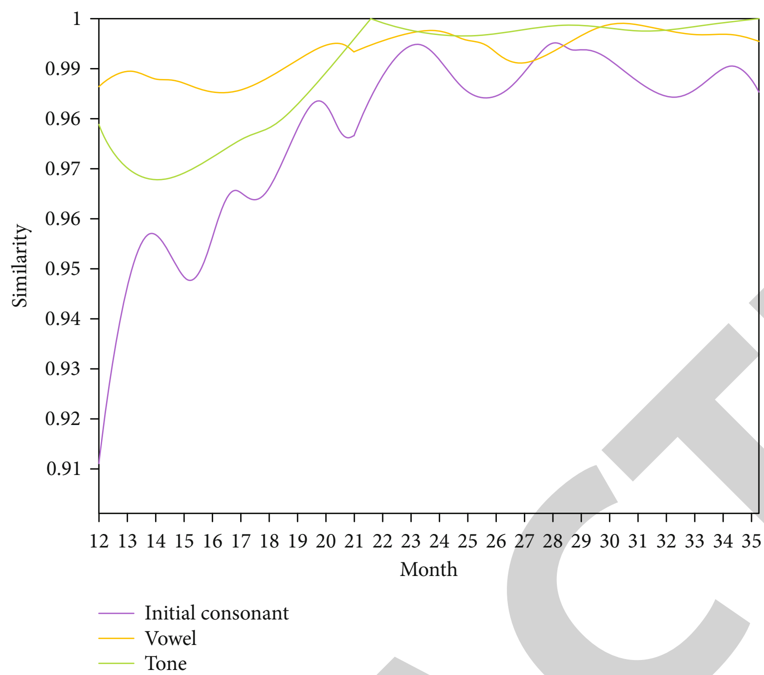

Figure 2: Comparison of vowels and tones in children's language acquisition.

The model associates the speech features of the nodes to be recorded with all syllables in the network and calculates the consonant and vowel features according to

$$\omega_{\text{target}}(t) = \sum_{a=1}^{n} \frac{\omega_{l_a}(t)}{\sum_{a=1}^{n} \omega_{l_a}(t)} \omega_a(t), \tag{13}$$

where the speech features represented by the associated nodes are expressed as $\omega_a(t)$.

Update the feature vectors of consonant and vowel nodes according to the rules expressed in

$$\omega_a(t+1) = \omega_a(t) + \omega_{l_{\text{mean}}}(t) \times \left(\omega_{\text{target}}(t) - \omega_a(t)\right). \tag{14}$$

Among them, $a \in N$, the speech feature obtained by the current target is expressed as $\omega_{\text{target}}(t)$, and the average weight of the mapping link is expressed as $\omega_{l_{\text{mean}}}(t)$. Through this stage, children construct the perceptual category of language phonemes, and on this basis, they continue to strengthen, review and understand the meaning of words, improve their perception, correct the understanding deviation, and realize the effect of language learning.

4. Experimental Results of Children's Psycholinguistic Development Model Based on Computer Digital Statistical Technology

This paper conducts a comparative experiment on the influence of children's psychological language development through the established computer digital statistical technology model. Psycholinguistics believes that children from 12 months to 36 months belong to an important period and turning period of language learning. According to formula (15), the frequency distribution characteristics of the influence vector of children's language development in the adjacent 60 days can be calculated, and its similarity can be analyzed:

$$r_{ij} = \frac{\sum_{a=1}^{n} \left(i_a - \bar{i}\right)\left(j_a - \bar{j}\right)}{\sqrt{\sum_{a=1}^{n} \left(i_a - \bar{i}\right)^2} \sqrt{\sum_{a=1}^{n} \left(j_a - \bar{j}\right)^2}}. \tag{15}$$

As shown in Figure 2, the results of comparison between vowels and tones in children's language acquisition show that there are fault turning points in children's language development from 12 months to 36 months, which basically occur between 18 months and 21months. There is a small similarity between vowels and tones in the first 60 days before the fault. After the fault, the similarity increases every 60 days and gradually tends to be stable. Combined with the experimental results of children's psychological language development behavior, children's language learning ability has developed to the correspondence between sound and semantics during this period, indicating that they are about to enter the emerging period of language vocabulary and their vocabulary has increased sharply. At the same time, children have completed the perceptual renewal of this stage, the language system has been basically established, and the language system has been strengthened and modified with the increase of children's communication with the outside world.

As shown in Figure 3, the statistical results of the frequency of consonants and vowels in words before and after the fault of children's language development are shown. The highest frequency of consonants before and after the fault is [t]. After the fault, the frequency of [p] is significantly

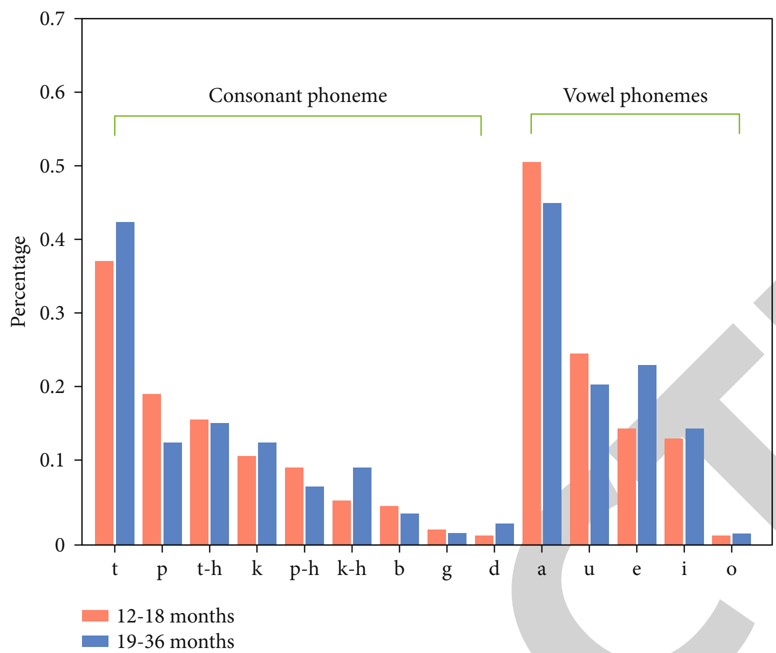

Figure 3: The frequency of consonants and vowels in vocabulary before and after children's language development fault was statistically analyzed.

reduced compared with that before the fault, while $[k^h]$ is on the contrary. Voiced consonants appear before and after the fault, but the number of frequencies is very small. After the fault, the frequency of vowel $[r]$ increased significantly, and the overall frequency before and after $[o]$ was low.

In the experiment, there are always many interference factors in the communication process between children and the outside world. In addition, there are certain differences in the pronunciation and intonation between teachers and parents, which cannot become the standard of comparison. Therefore, this paper selects the voice data of professionals as the standard and compares it with the resonance data of standard English. The results are shown in Figure 4. What is reflected in the figure is the comparison result of Chinese standard voice and standard English in the same acoustic space. Their pronunciation is very close to the standard data, and the characteristics of their language are truly displayed, which shows that the above voice data meets the data requirements and requirements of the following experiments.

The comparative experiment includes the prelearning part and the completed learning part and simulates and analyzes the changes of consonants and vowels of children in the two periods. Figures 5 and 6, respectively, show the representation results of consonant and vowel phoneme characteristics of preschool children in computer digital statistical model. The consonant representation results are realistic. There is a clear distinction between aspirated and nonaspirated bursts. In the range of aspirated bursts, there is a certain intersection between the regions of each consonant, but they basically form their own stable representation range. Inside the nonaspirated plosives, the consonants are basically characterized and stable. On the whole, the model can distinguish the unvoiced and voiced tones in the unvoiced plosives and the unvoiced and unvoiced plosives, which indicate that the model has formed the perception ability of standard English and Chinese consonant phonemes.

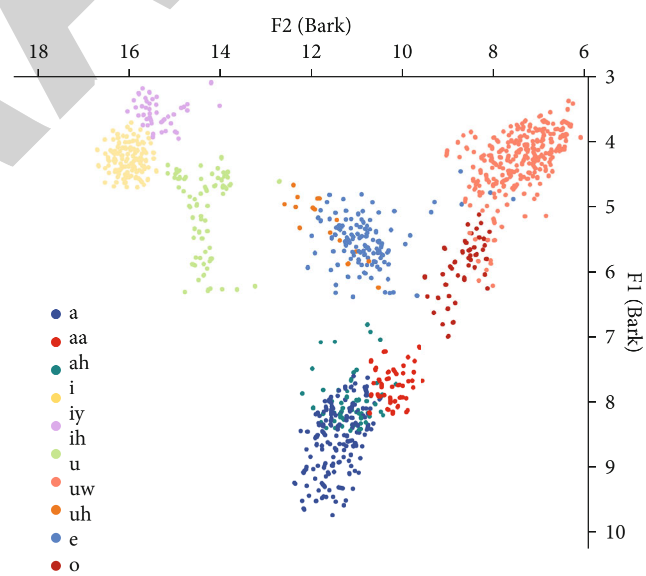

Figure 4: Comparison of resonance data between standard Chinese and standard English.

In the results of vowel network, in reality, the range of each vowel phoneme represented by the model is clear, and the vowel distribution conforms to the acoustic spatial

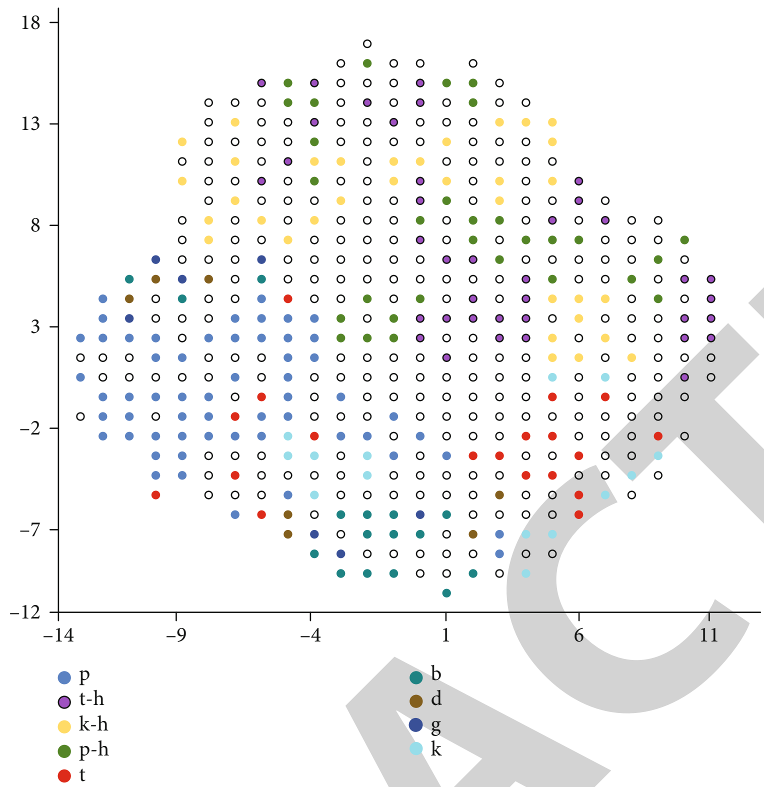

Figure 5: Representation results of consonant phoneme characteristics of preschool children in a computer digital statistical model.

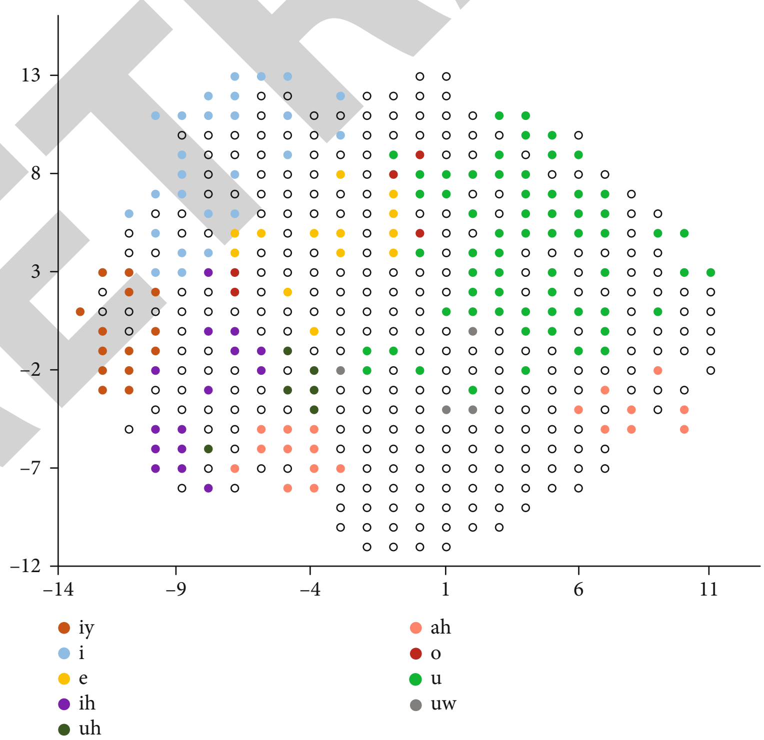

Figure 6: Representation results of vowel phoneme characteristics of pre-school children in computer digital statistical model.

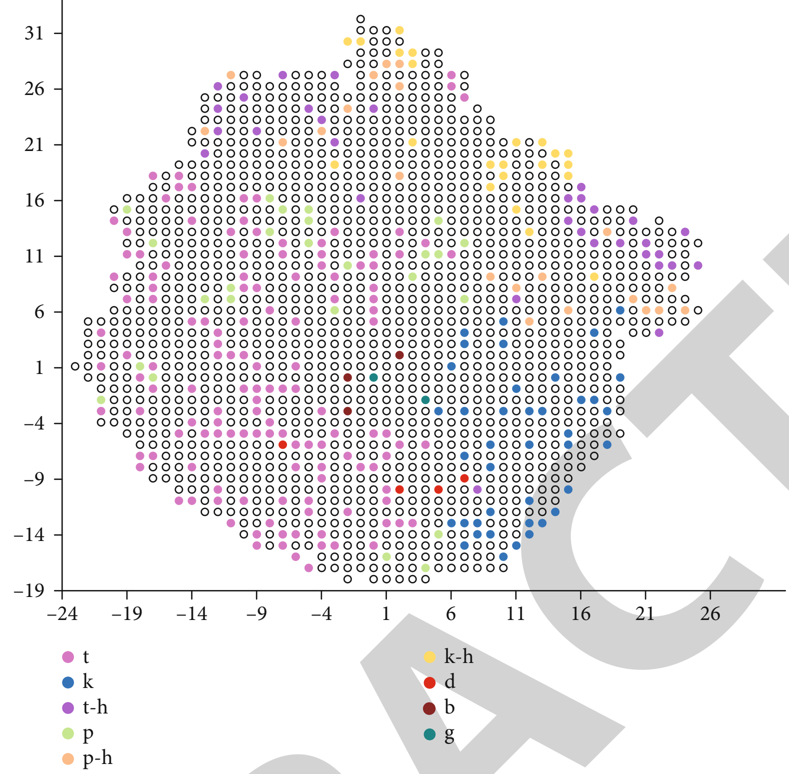

Figure 7: The model simulates the representation results of language consonant network characteristics after children complete learning.

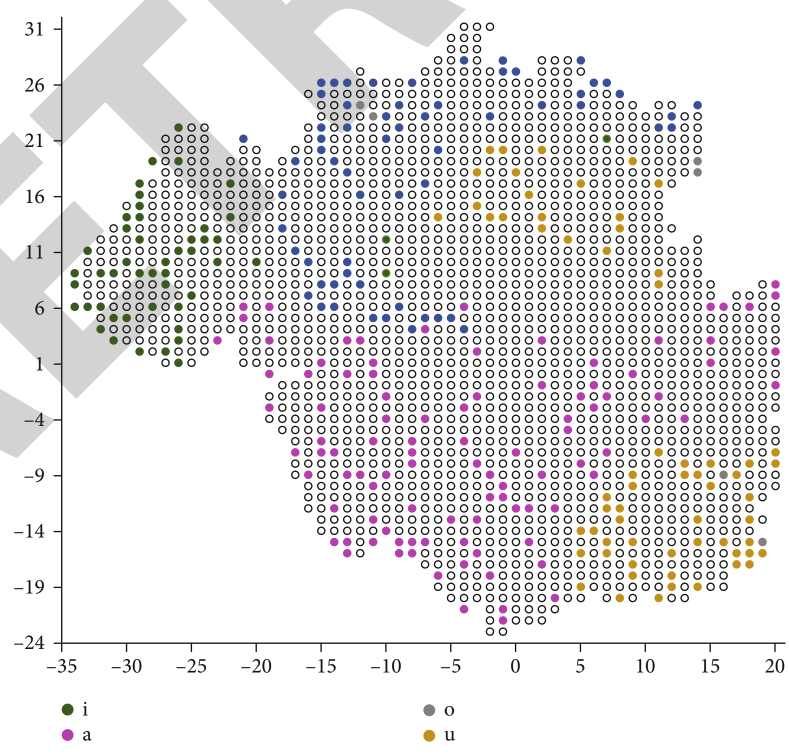

Figure 8: Phonological representation results of vowel network after children complete learning.

distribution relationship, which indicates that the training results of the model on the acoustic characteristics of vowels have met the requirements, which can clearly distinguish all the opposite phonemes of standard English vowels, clearly perceive Chinese vowel phonemes, and the ability of vowel perception has been formed.

Figure 7 shows the representation results of language consonant network characteristics after the model simulates children's learning. The environment in which children live has continuous input of language vocabulary, which has a continuous stimulation on children's language development, which improves the stability of consonant phoneme representation as a whole and increases the clustering and compactness of each consonant representation range. In the above analysis, the frequency and number of consonant [*p*] after fault in children are reduced. Combined with the situation before learning, the stability of its performance range after learning is relatively improved, and there is only confusion between small range and [*t*]. In addition, there are a few mixed phenomena between [*t*] and [k^h] in the representation range on the right side of the network. It is difficult to explain only from the perspective of consonant phonetic features. Combined with the role of corresponding semantic knowledge, it can be explained that when there are just two consonants in the relevant vocabulary, the children's brain processes the high-level constraints in the language, and the low-level constraints divide them into the same range. The emergence of semantic knowledge in children's language development will have a certain effect on the existing phoneme system.

The phonemic representation results of the vowel network after children's learning are shown in Figure 8. The overall stability of the representation is better. The clustering and compactness of the vowel representation range except [*u*] are improved, while the [*u*] representation is divided into two parts and surrounded by the vowel [*a*], which may be due to the local range reorganization of the model. In addition, there are also small-scale mixing in vowel [*o*], [*u*] phonemes, which is similar to consonant phoneme mixing.

5. Conclusions

(1) This paper introduces the computer digital statistical technology model into the research experiment of the impact on children's psychological language development and simulates and analyzes children's psychological language development based on the dual theory of language model and self-organizing neural network model. The experimental results show that the model can perceive the phoneme region of language data through training. The simulation results of children's prelearning stage show that children's brain has established the basic perception of language consonants and vowels under the stimulation of environmental language, and basically formed the corresponding phoneme range

(2) There is a wrong turning point in children's language development between 12 and 36 months, basically between 18 and 21 months. During this period, children's language learning ability developed to the correspondence between pronunciation and semantics, and their vocabulary increased sharply. Children completed the perceptual renewal at this stage, and the language system has been basically established. With the increase of children's communication with the outside world, the language system has been strengthened and modified

(3) The model simulation results show that it improves the clustering and compactness of children's consonant and vowel phoneme range and can clearly distinguish the relationship between aspirated phonemes and nonaspirated phonemes. The perception of vowel speech features is consistent with acoustic spatial features. In addition, there is still confusion between some consonants after learning. One part is due to the influence of language semantic knowledge, the other part is due to the phenomenon caused by the local update of the model itself, which needs to be further improved

Data Availability

The figures used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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