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CHALMERS UNIVERSITY OF TECHNOLOGY

**Lingfei Kong** Master Thesis Spring 2020

Matter, Space, Structure What I Talk about When I Talk about Architecture \_Translation methodology between language and space

Chalmers School of Architecture Department of Architecture and Civil engineering Master Program in Architecture and Urban Design

> Supervisor: Peter Christensson Examiner: Morten Lund



你好 God dag **HELLO** 안녕하세요

Hola こんにちは Guten Tag

Ciao

## **BONJOUR**

Saluton

## **0** READING INSTRUCTIONS

In my master thesis, I want to talk about how can architecture communicate with other disciplines. I chose language as a symbol of culture, try to find a translation methodology from linguistic to space, compare the difference of phonetics between different languages and apply the new design system into different sites(poetry).

This thesis is divided into three parts:

#### Intruduction and Appendix

First comes the proposal of this study. Abstract, keywords and background include the motivation, purpose, plan, methods and a conceived conclusion to this research. With the *delimitation diagram*, the *questions* can be understood in a more clear logic. The discourse introduces the references in more detail and explained the inspiration for this project. Then an interpretation of *language structure* will guide design and reading process. At the end of the booklet, student background and bibliography can be seen. There is also a brief introduction of some basic articulatory terms.

#### **Design Process**

The second part is showing the *translation methodology* from language to space. It is divided into three steps. Firstly, phonetic system is considered. By abstracting the shape of oral cavity while phonating and articulating, architecture phonetic alphabets from Chinese and English are created separately. After that, a series of spaces are composed with guidance of syllables, and the change of tone and stress will influence the colour and thickness of materials. The word "Architecture( 建筑)" is shown as an example. Finally, the intonation of different sentences impact on the transparency of the material inside spaces.

#### **Application and Conclusion**

Then the research goes to application of this system. Poetry is regarded as site and poems in different languages show different characteristics of the site. A museum of poetry is designed with impact of the design system and the context of poetry. After a discussion and conclusion in the end, further research to continue this thesis supposes to find the collective memoty of language and architecture and to improve cross-cultural understanding and the intercultural sensitivity.

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## 1.1 ABSTRACT

In the long history of human civilization, the appearance of language and architecture are of great significance. Language is a medium for human to communicate and exchange ideas, while architecture, besides being a shelter for human life, also contains design ideas and national characteristics.

This project will select two specific languages: Chinese and English, and create a translation methodology from different languages into space. By understanding the linguistic structure and features, which are ranging from phonetic system, lexical system, and grammatical system to language-related artistic expressions such as poetry for deconstruction, a methodology and a new design system of spatial translation are generated.

Firstly, a phonetic alphabet of architecture will be produced. By abstracting the shapes of the oral cavity during pronunciation, changes of airflow can be seen in space. Then the alphabet will be combined under the guidance of syllables, tone and stress to form different spatial shapes, sequences and feelings. Finally, the intonation of different sentences impact on the transparency of the material inside spaces. Then the research will focus on the artistic expression of languages. Language-related artistic expressions such as poetry can also be the source of spatial translation.

## CLAIM

In this project, I try to find a translation methodology from language to architecture and create a new design system. I want to show the differences between languages by space and the space change when we pronounce. In the end, a design proposal will show the design system considering on different contexts.

## **KEYWORDS**

Space / Linguistic / Phonetic / Translation Methodology / Poetry / Museum

#### **1.2 BACKGROUND**

What we talk about when we talk about a nation, a country, or a city? We may not talk about issues of economics or politics, but we never shy away from cultural topics. We will be interested in customs and local cuisine and feel the ethnic characteristics from the local languages, natural environment, urban features and landmarks. Culture is a broad and the most humanistic concept. It can be easily understood as the forms of human life in the region: clothing, food, shelter, travel and etc. It is indeed very difficult to give an accurate or precise definition of culture. Interpretation of the concept of culture can have a more common explanation and understanding: culture is all human spiritual activities and their products in terms of politics and economy. In such a wide range of cultural topics, this project focuses on two important cultural components: language and architecture.

Language is an important tool for communication. It is a medium for people to exchange ideas. It can be said that there can be no culture without language. Language is a complex symbol system composed of vocabulary according to a certain grammar. A phonetic system, a lexical system, and a grammatical system make up the structure of language. However, the origin of language is inconclusive. But the important role of language plays in the process of cultural communication, expression, transmission and inheritance cannot be ignored. At present, there are about 7.6 billion people in the world, living in 224 countries and regions, and 5651 languages are identified and being used. Among these languages, there are more than 1,400 languages that have not yet been recognized as independent languages or are dying.

On the other hand, architecture is also a narrator of human civilization. No matter ancient buildings or modern spaces hold the history and collective memory along side the evolution of culture. Architecture can be understood as a set of spatial sequences consciously constructed by human. Compared with the language system, components of architecture system could be seen like material, constructions and structures, single space, spacial combination and buildings. Functional requirement, constructional rules, natural environment and even hierarchical system can influence the spacial order and building style. Just as grammar, semantics and pragmatics in language system, these elements not only establish rules for the external appearance of buildings, but also found the connotation of architecture.

In this context, the project intends to explore ways to communicate architecture with linguistic. It is of research significance to generate a new design system by finding a translation methodology between language and architecture. What is the correspondence between linguistic and architectural space need to be answered firstly. The Swiss linguist Saussure interpreted language as a social convention in '*Course in General Linguistics*'. He proposed that language is a symbolic system reflecting social psychology. Language symbols connect not things and names, but concepts and sound images. Only the combination of meaning and acoustic image is the main purpose. Therefore ponetic system would be paid more attention in this project to built prototype at the beginning.

Have you ever had such a question that our oral cavity structure is basically the same, but the pronunciation of different languages are ever-changing. No cexact conclusion has been drawn on the causes of the difference, just as the origin of language is still untraceable. What this project wants to focus on is not the causes of different pronunciations, but the spatial changes of cavity according to these differences. I see our vocal tract as an architectural space inside our physical body. Thus the connection between linguistics and architecture can be established with phonetics. Then, it is time to translate vocal tract into a series of spaces to show the shape of different sounds. The movement of articulations and the change of vocal cords during articulate and phonate are two main reasons make sounds different. With curves in different states to represent articulations and vocal cords, '*phonetic alphabets of architecture*' could be created.

The project will select Chinese and English as examples, to show the result of translation and form a contrast. Every units in the alphabet will be composed into groups of spaces according to the combination of syllables. What is important is not the sound of a word, but the sound difference that distinguishes the word from any other words. Similarly, the pattern of space can be identyfied and recognized while comparing with each other. By combining units from the alphabet, the space change when we pronunciate can be shown. Tone and stress will control color and thickness of material while intonation of sentences will impact on the transprancy. The end of the project will focus on the application of the methodology in poetry. With the influence of regular and rhythm of poems, a series of spaces will be designed as the circulation inside a museum of poetry.

## **1.3 QUESTIONS**

- What is the structure of language and architecture system?
- What is the correspondence between linguistic and architectural space?
- How can language translate into an architectural desing system?
- What kind of space could I create according to the guidance of translation?
- How can I use the new design system in different contexture of 'site' ?
- What is the link between the system and 'site' ?

## **CORRESPONDENCE**

As mentioned in the background, at the beginning of the project, the correspondence between language and space need to be found out. An important concept of linguistics is the combination of meaning and acoustic image. The generation of speech is achieved through the movement of vocal tract. As we can see, the vocal tract is a cavity tissue inside our physical body structure. It is through the transformation of this space that different-shaped air flow channels are generated. Thereby different sounds are pronounced. Such a series of airflow channels can be regarded as the shape of sound. Thus, the connection between linguistics and architecture is established through speech and airflow channels.

The delimitation diagram shows some points in two system and linking concepts for translation. The detailed translation process will be explained in 'Phonetic alphabets' and 'Space composition'. Through the interpretation of linguistic and architectural system, the main points of translation can be matched. Different sounds correspond to different spaces. The shape of the vocal tract will have a figurative translation. However, pronunciation is a constantly changing process of the vocal tract. The process and trend of changes are the factors that truly control the composition of a complete spatial sequence. The space translated in this way is not only a place to show the activities of air flow (people movement), but also contains different meanings and emotions.

## **1.4 DELIMITATION**

**LINGUISTICS** 

**Phonetics** Phonate Articulate *Syllables* Lexical Sentences Intonation Rhythm **Poetry** 

> **TRANSLATION** Vocal Tract Vocal Cords

Space shape

Spacial order

ARCHITECTURE

Pitch & Tone Stress & Intensity

**SPACE** 

Oral Cavity

Curve radian Length Spacial emotion Thickness of materials *Color of materials* Transprancy of materials *Turning point* Circulation

## **1.5 DISCOURSE**

#### **Course in General Linguistics**

Ferdinand de Saussure, Columbia University Press



This book is a compilation based on lectures of Saussure, who is the founder of modern linguistics. The most important conception presented by Saussure is that language is a social system related to the semiology. Language is a collective product. It is not a personal act of the speaker, but a rule that all speech acts must obey. In Saussure's view, we can only understand the world by distinguishing between them. The concept does not exist before the word. The language, as an intermediary, extracts a paragraph in a continuous voice to help us identify the meaning of piece thought. This is how language acts on us as a symbolic system: it relies on the differences between the signifiers (syllables). We can grasp a certain concept, not because we can understand this concept alone, but realize that this concept is different from other concepts.

## **Phonetics: Transcription, Production, Acoustics, and Perception**

Henning Reetz, Allard Jongman, John Wiley & Sons



This book has a systematic and detailed introduction of phonetics. From the structure of vocal tract to the composition of sound segments, this book discusses how to record speech on the basis of understanding the principle of phonation and phone characteristics. The 'board transcription' mentioned in the book is the principle of the translation methodology used in this project, and the classification of consonants and vowels is used during the translation to clarify the difference between each symble. The 'narrow transcription' that shows the details of each speech sounds gives me more inspiration while I distinguish spacial order and emotion.

## A Pattern Language: Towns, Buildings, Construction

Christopher Alexander, Oxford University Press



"This language, like English, can be a medium for prose, or a medium for poetry. The difference between prose and poetry is not that different languages are used, but that the same language is used, differently."

1.5.3

This book proposes more than 250 patterns of architectural language, which could solve social and spatial problems. In fact, the identification of spaces and the organization of the architectural patterns mentioned in the book responds to the linguistic viewpoint put forward by Saussure from the architectural aspect.

It can be seen that this book tries to help us understand the differences between various patterns by organizing them. Different uses of the same language make expression meaningful. Different ways of organizing the same pattern respond to different space requirements. This is also based on ideas how we understand the meaning through differences, and further proposes how to use differences to create different spatial sequences.

The patterns mentioned in 'A Pattern Language' is not what this project borrows. What really inspired me was the idea of using differences. The spatial prototype obtained through translation does not have rich meaning in itself. They represent different phones and embody different pronunciations, but do not contain emotions. It is even difficult to experience their differences. Only when these symbols are connected to each other and combined into a spatial sequence will differences be magnified with changes in space. Such changes are factors that really make the meanings of space unique and denser.

*— Christopher Alexander* 

DISCOURSE

## **1.5.2 THE MANHATTAN TRANSCRIPTS**

"Architecture is not simply about space and form, but also about event, action, and what happens in space. The Transcripts aimed to offer a different reading of architecture in which space, movement, and events are independent, yet stand in a new relation to one another, so that the conventional components of architecture are broken down and rebuilt along different axes."

— Bernard Tschumi

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1.5.4 (Tschumi, 1994)











The most direct purpose of 'The Manhattan Transscripts' is to express and explain the understanding of the relationship between events, movement, and space from Tschumi. He believes that human body and movement are the defining elements of space. Each uncertain factor provides infinite possibilities for the form of the building, and behavior itself can help the space to obtain a unique and definitive answer.

Tschumi inspired me a lot about how to translate between different concepts. Events, movements and spaces can correspond to pronunciation, the activities of vocal tract during phonating and articulating and the spatial changes respectively. The way in which the space is generated and the method of drawing are also influenced by him. And his practical application of the theory pushed me to think about how to apply the design system I created into different sites with considering of different contexture.

Sign language is a special language used by deaf people to communicate. Different gestures can be regarded as syllables in language. Some of them can express a complete meaning independently. The others need to be combined to express more content. In the expression of sign language, facial expression is an important role that cannot be ignored. The expression is like a intonation or a tone of speech, which has an influence on the meaning and emotion. This made me start to pay attention to the role of tone and intonation in my design system. The expression of spacial emotion will make the meaning of space denser.



1.5.6 (https://www.pinterest.co.uk/pin/599682506619124960/)

## **1.5.4 POETRY: RHYME AND RHYTHM**

Poetry is a highly organized way of using language. It expresses the emotions of author and reflects social life with a certain rhyme and rhythm. Different rhyme and rhythm can control spacial order. The tempo and stress while reading will influence different spatial characteristics. Poetry is regarded as the site for application in this project. The different ways to use language in different poems are the contexture to be considered in sites.

**将讲洒**唐·李白

君不见黄河之水天上来,奔流到海不复
君不见高堂明镜悲白发,朝如青丝暮成
人生得意须尽欢,莫使金樽空对月。
天生我材必有用,千金散尽还复来。
烹羊宰牛且为乐, 会须一饮三百杯。
岑夫子,丹丘生,将进酒,杯茣停。
与君歌一曲,请君为我倾耳听。
钟鼓馔玉不足贵,但愿长醉不愿醒。
古来圣贤皆寂寞,惟有饮者留其名。
陈王昔时宴平乐,斗酒十千恣欢谑。
主人何为言少钱,径须沽取对君酌。
五花马、千金裘,
呼儿将出换美酒,与尔同销万古愁。

#### **SONNET** *William Shakespeare*

And dig deep trenches in thy beauty's field, Thy youth's proud livery, so gazed on now, Will be a tottered weed of small worth held: Then being asked where all thy beauty lies, Where all the treasure of thy lusty days, To say within thine own deep-sunken eyes Were an all-eating shame and thriftless praise. How much more prasie deserved thy beauty's use If thou couldst answer, 'This fair child of mine Shall sum my count and make my old excuse,' Proving his beauty by succession thine. This were to be new made when thou art old And see thy blood warm when thou feel'st cold.

回。 雪。

## 2.1 LANGUAGE STRUCTURE

The structure of language can be summarized into three main systems: *phonetic system*, *lexical system and grammatical system*. Under the control of these systems, language has five important components: *phonemes*, *morphemes*, *lexemes*, *syntax and context*. These components work together to create meaningful communication among individuals with impacts of *grammar*, *semantics and pragmatics*.



#### **Phonemes**

A phoneme is the smallest unit of language. It may cause a change of meaning, but doesn't have meaning by itself. For example, in the words "buy /bai/" and "boy /bbi/", only one phoneme has been altered, but the meanings are totally different. The phonemes /ai/ and /bi/ have no meaning on themselves, but it has completely changed the meaning of words. As the smallest language units, the starting point of translation will also focus on the phonetic system.

#### Morphemes

Morphemes are the smallest meaningful units of language. It is in the phonology system to show the combination of series of phonemes with a certain meaning. Some morphemes are individual words such as "snow", which are known as free morphemes. They can exist on themselves. Other morphemes are prefixes, suffixes, or other pieces in language that affect meaning such as the "re-" at the beginning of words means 'again'. These are called bound morphemes, because they must be attached to another. This project will use the principles of this system to organize prototypes and generate spatial excerpts.

#### Lexemes

Lexemes are the set of forms of a single word. For example, members of the lexeme WRITE include "write", "writing", "wrote" and "written". This lexeme excludes "writer" which has been attached by another morpheme to change part of speech.

#### **Syntax**

Syntax is rules for construction of sentences. Word order matters in some languages, such as Chinese and English. Different orders will change the meaning of the sentence, even though exact the same words are used. However, in some other languages, word orders are less importance. They are used to emphasize different parts of the sentence.

#### Context

Context is how every unit of language works together to convey a special meaning. Context includes tone and intonation of voice, body language, facial expressions and the method to use words. A variety of different messages can be conveyed by the way of saying or the points of the sentence being emphasized.

#### Major levels of linguistic structure

This diagram outlines the relationship between linguistic units. Speech sounds is seen as phonemes, which make up morphemes. Morphemes constitute into words, which make up sentences. Different sentence-structure convey specific meanings, messages and emotions.

The translation of this project follows the similar levels of structure. It starts with using phonemes as the smallest unit to generate the prototype. The spatial sequence is constituted in the same way as phonemes make up words and sentences. Thus, the rules and logic of language are presented in the form of space.



2.1.2 Levels of linguistic structure

## 2.2 PHONATION AND ARTICULATION

The thesis summarizes the phonetics theory in 'Phonetics: Transcription, Production, Acoustics, and Perception', in order to let readers understand the logic of the translation methodology more clearly. In chapter 2.2, I will give a brief introduction of the components of phonetics system and explanation of some trems in this discipline. This chapter main *focuses on introduction of the principle of phonation* and articulation, as well as the movement of the vocal tract during pronunciation. More knowledge on segmental and prosodic units will be introduced in detail in subsequent chapters.

Language is the intermediary of thought and the most important methods of communication. It exists in two main forms: oral and written. The content of oral speech is phonic, and the content of written speech is graphic. The speech sound constitutes units of the phoetic system of a language.

Phonetics, the study of speech sounds and their physiological production and acoustic quality. It processes the configuration of vocal tract used to produce phones (*articulatory phonetics*), the acoustic characteristics of phones (*acoustic phonetics*), and the way in which sounds are combined to form syllables, words, and sentences (linguistic phonetics). The translation main focuses on articulatory and linguistic phonetics, rather than acoustic phonetics in this project.

The *phonetic system* of language is a group of phonetic units arranged in an orderly manner. It contains two systems or levels - segmental and prosodic. Segmental units are basic sounds, vowels and consonants, which constitute the vocalic and consonantal subsystems. Prosodic units are syllables, rhythmic units and intonation groups, which constitute subsystem of pitch, stress, rhythm, tempo and pauses.

The sound is a medium that reflects the entire language system. Segmental and prosodic units are used to form and distinguish other units of other subsystems of language, the lexical and grammatical units. As the language structure introduced in Chapter 2.1, speech sounds are the smallest units of language and also a segment to differentiate the meaning of words. By changing the prosodic structure like tone and intonation, it can change the emotion and messanges conveyed in the utterance.

To understand *articulatory phonetics*, we must know the '*Place and Manner* of Articulation'. There are two main processes of pronunciation: phonation at the larynx and *articulation* at the vocal tract. We can simply understand that phonation is a process of airflow generation, and articulation is to produce

different sounds by changing the shape of the air passages. These two actions are in no particular order of time, only mean a sequence order of airflow.

Phonation is controled by larynx. Whether the vocal cords vibrate or not divides the phonetics into two categories: voiced and voiceless sounds (There is a special kind of phonetic named as *aspirated sound* in Chinese that puts more air outside than the voiceless sounds with no vibration of vocal cords.) The vocal cords also produce different tones, stress and intonations for meaning and emotion expression.

The vocal tract consists of the pharynx (throat), the oral tract (mouth), and the nasal tract (nose). As a side view shown in figure 2.2, it is a cavity tissue located above the larynx. The organs that play a role in the articulation process are called articulators. Which articulator has movement, and the manner of movement determines the difference in sound. The shape change of the vocal tract is the process of articulation.

By understanding the process of pronunciation, we can know that each sound segment has a corresponding shape of vocal tract and state of vocal cords. This provides a bridge to link language with space. This process shows the shape of the sound. In the following chapters, the project will use Chinese and English as examples to describe the shape of the phones in more detail.

This diagram provides a basic overview of the organs and structures in the vocal tract. The basic principle in speech production is that one articuator approaches or touches another articulator. Those articulators that move are called the *active* articulators and those that are stationary are called the *passive articulators*.



2.2 Vocal tract (Reetz and Jongman, 2020)

## **3.1 VOCAL TRACT TRANSLATION**





21201						
3.1.2 Grid						



3.1.3\_Stage 2

As mentioned in chapter 2.2, each segment has a dedicated air passage. Such cavity structure provides a bridge for the translation from language to architecture. These unique air passages represent shape of sounds. After abstracting the shape of the articulators and vocal cords, the section of the cavity under normal breathing state can be obtained.

Then, the graph will be controlled in a  $10 \times 10$  grid. This grid can give a sense of spatial scale to the cavity, and also serve to regulate the position of curves to show the manners of articulation. The curves begin to become orderly, rather than drawn randomly. Most of articulators are located in the oral cavity. The illustration of organs in the oral cavity is particularly an important work in the process of translation.



3.1.5\_'l' in Chinese



To further simplify the structure of the air passages, some repetitive lines for passive articulators with no changes will be removed, such as the top of the nasal cavity and the bones of the palate. The image will retain the graphic lines for active articulators to highlight the spatial shape changes caused by their movements.

Pronunciation is actually a movement of airflow. The state of the vocal cords and the shape of the vocal tract control the size of this obstruction, thereby creating a cavity shape corresponding to the sound. Take consonant "I" in Chinese as an example. The lips and tooth are half open. The tongue fits up against the upper gums, then opens to let the air flow out to pronunce. The series of shape changes can be divided into two major categories: consonants and vowels, and then each phone is obtained according to the place and manner of articulation. In the following chapters, each phone will have a graphic. This figures show the shape of the sound by showing the space through which the airflow passes when the phone is uttered.

3.1.4 Stage 3

PHONETIC ALPHABETS

## **3.2 THE ARTICULATION OF CONSONANTS**

Although every language seems ever-changing, the number of its smallest unit, phoneme, is actually limited. Speech sounds can be classified into two categories: *consonants* and *vowels*. It is the collocation of consonants and vowels that enriches the diversity of language.

This chapter begins with consonants first. Consonants are important parts of syllables. In a syllable, it must depend on the existence of vowels. Consonants are produced by the obstruction of airflow in the mouth, nose, or throat. When pronouncing, the airstream is blocked by the articulators. Such phonemes are often not clear and loud enough.

Therefore, consonants can therefore be classified according to *the position and extent of obstruction*, or, in linguistic terms, *the place and manner of articulation*. In IPA(International Phonetic Alphabet), consonants are divided into 11 types according to the place of articulation. According to the manner of articulation, consonants can have 8 categories. Whether the vocal cords vibrate can divide consonents into *voiced and voiceless sounds*. All languages have *plosives*. Most languages have at least one *nasal* phoneme.

In fact, the language cases selected in this project do not have all kinds of consonants. Next, I will use the graphics to translate the spatial characteristics of different types of consonants.

	Bila	bial	Labio	dental	De	ntal	Alve	eolar	Postal	veolar	Retr	oflex	Pala	atal	Ve	lar	Uvu	ılar	Phary	ngeal	Glo	ottal
Plosive	p	b					t	d	~		t	þ	c	Ŧ	k	g	q	G			?	
Nasal		m		ŋ				n				η		ŋ		ŋ		N				
Trill		В						r										R				
Tap or Flap								ſ				t										
Fricative	φ	β	f	v	θ	ð	s	z	l	3	ş	ą	ç	j	x	Y	χ	R	ħ	S	h	ĥ
Lateral fricative							ł	ţ		-												
Approximant				υ				1				ŀ		j		щ						
Lateral approximant								1				l		λ		L						

3.2.1\_Consonants in IPA

#### 3.2.1 The place of articulation



A consonant formed by the contact of the *upper lip and the lower lip* to obstruct airflow.



Labiodental

A consonant sound produced by the bite of *the lower lip and the upper teeth*.



When pronouncing a dental, *the tip or blade of the tongue* is against *the upper front teeth*.



When pronouncing an alveolar, *the tip or blade of the tongue* is against *the alveolar ridge*.



Postalveolar

The tongue tip or blade approaches to the alveolar ridge and the front part of the hard palate.



Palatal

It is uttered by *the front of the tongue* and *the hard palate*. Palatal replaced by retroflex in Chinese.





Glottal

Velar is produced by *the back of the tongue and the velum*.

Glottal is created when air is blown through widely separated vocal cords.

#### 3.2.2 The manner of articulation



Plosive

Lines representing two artistors are in contact with each other. No gap for air to escape.



Fricative

Lines representing two artistors are close to each other to form a narrow air channel.



Nasal

An affricate is to utter a plosive and a fricative in a certain sequence.

The central pathway

of airflow is blocked

and the air blows

The oral cavity is

blocked. The velum

is lowered so that

air can escape from

the nasal cavity.



Approximant

Lines representing two artistors are close to each other, but the gap between is enough for air pass.

*Lateral Approximant* obstruction.

#### 3.2.3 The vibration of vocal cords



The bending direction of the curve and the opening distance between the horizontal and vertical lines work together to show whether the vocal cords vibrate or not.

## **3.3 THE ARTICULATION OF VOWELS**

In the production of vowels, the airstream is almost unobstructed. Generally, the vocal cords almost always vibrate and serve as a sound source. The location of the tongue changes the size and shape of the vocal tract, which control the sounds of different vowels. *The position of the tongue and the shape of the lips* are criteria for vowels classification. In articulatory terms, it can be described as *Frontness, Hight and Lip rounding*.

The vowel quadrilateral is a chart used to distinguish vowels in the IPA. The point of intersection represents the position of the highest point of the tongue surface. The whole oral space can be divided into different areas according to this table.

## 3.3.1 Tongue Location

The vowel quadrilateral provides a standardized template for the spatial translation in this project. In the simplified graphic of the vocal tract, the space for the movement of the tongue can also be divided into areas based on the  $10 \times 10$  grid. In this way, I can get the highest point of each vowel in the figure. By making the curve tangent to the intersection, each vowel has a unique air passage.

#### 3.3.2 Lip rounding



According to the state of lips, vowels can be divided into round vowels and non-round vowels.The circle representing the lips usually in a state of fitting with the teeth. The circle outside the vertical line indicates the lip shape of the round vowel.





## **3.4 ARCHITECTURE PHONETIC ALPHABETS**

#### 3.4.1 Chinese

Bilabial

m

Chinese is one of the most common languages in the world. It is an international language with a long history. By studying and classifying phonemes in Chinese in the way mentioned above, 22 consonants and 23 vowels can be extracted. By defining the place and manner of articulation, each phoneme is given a more accurate identification. They are arranged in the similar way to the IPA.

The spatial graphic corresponding to each phoneme follows the generation logic described in chapters 3.2 and 3.3. Different kinds of curves and lines work together to formulate the air passages when pronouncing and define the shape of

Dental

Ζ

Alveolar

n

Labiodental

each phoneme. It is worth noting that pronunciation is a process that the shape of the vocal tract is changing all the time. The graphics obtained in this stage can be understood as the section of a channel extracted by pause during speaking.

#### 3.4.1.1 Chinese consonants

Retroflex

Figure 3.4.1.1 is the consonants alphabet of Chinese. In order to make the comparison more directly, the table keeps the column of 'Glottal', although no phoneme in Chinese is similar to the articulate manner of it. In the same place of articulation, the left side is the aspirated sound, and the right side is the voiceless consonant.



sh

r

Postalveolar

Plosive

Nasal

Fricative

Lateral App Approximant Affricate

р

28

h

27



3.4.1.1\_Consonants alphabet of Chinese

#### 3.4.1.2 Chinese Vowels

There are eight basic vowels in Chinese: /a/ /o/ /e/ /ê/  $i/u/\ddot{u}/er$ . In addition to the basic vowels, the other three images in the figure represent that in some special cases, vowels /i/ and /e/ sounds different. In fact, it is impacted by the consonants pronounced before vowels. While speaking a complete syllable, the position change of the articulators is a continuous movement. In order to make the syllables more coherent and convenient to say, the phonemes will form a different shape of the cavity.

The most important change of vowels space can be reflected by changing the position of the curve representing the tongue. Figure 3.4.1.2 arranges the graphics in the grid of the vowel quadrilateral, so that the readers can feel the change of tongue position of different vowels more intuitively.



3.4.1.2 Vowels alphabet of Chinese

#### Chinese diphthongs

By combining vowels, 13 diphthongs can be extracted in Chinese. In the figure below, a combination pattern named as /iai/ that appears in Chinese speaking is given to enrich the diversity and integrity of the system. When pronouncing dipthongs, the position of the tongue and lips moves from the black line to the blue line and finally to the purple line. These figures actually represent the dynamic process of movements.

#### Vowels followed by a nasal consonant

The 16 phonemes shown below cannot be generalized to vowels. The addition of nasal consonants makes the line representing the velum begin to swing, which makes the spatial changes more complex. These diagrams show the flow of space and define the shape of sounds.



an



(



eng

3.4.1.3\_Diphthongs in Chinese



3.4.1.4\_Nasal vowels in Chinese

## 3.4.2 English

English is the most popular language in the world. The development of international phonetic systems is largely based on English phonetics. Through the above translation methodology, 24 consonant spaces and 20 vowel spaces can be obtained in English. The writing of English phonetic symbols needs to be distinguished from English letters. There is no corresponding relationship between them, nor can they replace each other.

#### 3.4.2.1 English consonants

Figure 3.4.2.1 is the consonants alphabet of English. In the same place of articulation, the left side is a voiceless consonant and the right side is a voiced consonant. The column of 'Retroflex' has been replaced by 'Palatal'. More detailed comparison between the Chinese and English alphabets will be developed in Chapter 3.5.



3.4.2.1 Consonants alphabet of English

#### 3.4.2.2 English Vowels and Diphthongs

There are 12 vowels and 8 diphthongs in English. Vowels are arranged in the same way in the vowel quadrilateral. In figure 3.4.2.2, two diphthongs-/əu/ and /ei/ are also listed. The particularity of these two diphthongs is that the vowels that make up them utter together in no particular order, so that the position of the tongue remains unchanged. Two separate vowels are combined into one sound.

The other diphthongs reflect the gliding of tongue position in the process of articulation. The tongue slides from black line to blue line, reflecting the dynamic change of space.

aʊ

ບອ

аі

IƏ



3.4.2.3\_Diphthongs in English

0

0

JI

eə

3.4.2.2\_Vowels alphabet of English

## **3.5 COMPARISON OF ALPHABETS**

#### 3.5.1 Consonants

There are many differences between Chinese and English consonants, which can be summarized as follow.

1 Aspirated sounds are common in Chinese, which are not found in English consonant system. There are only four voiced consonants in Chinese-/m/ /n/ /ng/ and /r/-while many voiced consonants in English are paired with voiceless consonants.

2 In Chinese, there is no palatal sound but retroflex, which is the opposite in English.

3 There are more frications in English and more affrications in Chinese. It seems that English spatial shape tends to be more stable and gentle, while Chinese spatial shape is more complex and changeable.

It should be noted that the same phonetic symbols do not mean that they have the same spatial form in the two language systems. For example, /j/ and /h/ represent two completely different sets of spaces. Whether the sounds are the same cannot be confirmed by the name, but the spatial diagram.



Plosive Lateral Appro AffricateFricative Nasal

#### 3.5.2 Vowels





The difference between vowels is even greater. It can be said that there is almost no identical set of spaces except for a few vowels like /e/ /i/ /ə/ and /u/. The combination of the diphthongs is also different in two languages. In Chinese, the nasal consonants is placed behind the vowel to form a phoneme. In the vowel system, the change of Chinese space is more flexible and abundant, and the frequent change of tongue position makes the spatial form more dynamic.

## 4.1 SYLLABLES

Syllable is the smallest unit of the phonological system. It always combines with a vowel and a consonant. A vowel or a diphthong can also form a syllable by itself. In fact, there is no concept of syllable in Chinese. It can be analyzed with consonants, vowels and tones. The initial sound is the consonant, the rest is the vowel, and the tone is the pitch of the entire syllable.

The combination of syllables is the process of forming the space of syllables. Consonant space and vowel space are connected according to the order of pronunciation to form a series of space. These graphics can be regarded as sections of syllable space at different nodes. The corresponding articulators in different figures are smoothly connected in this order, and the change of organ shape and position leads to the wall of dividing space.

Words are made up of syllables. This project does not explore the principle of word formation, but based on the existing corpus to express the form of language. The formation of syllables determines the order of phonetic graphics, while the structure of words determines how to splice syllables. A syllable organizes the order of sections (phonetic figures) in a certain length, and then concatenates to produce the shape of words.

In this chapter, words 'JianZhu' in Chinese and 'Architecture' in English will be uesd as examples. The syllables of this word are disassembled to show the process of translation. I first find pictures of phonemes in the phonetic alphabets of architecture, and arrange them in groups based on syllables. Syllables determine the distance between the two figures, which also

ian zh u ian zh u

4.1.1 Syllables of JianZhu

are finally combined into the space of words. In the application, the space of sentences will be presented.







# reflects the tempo of speech changes in different syllables. In this step, syllables

## 4.2 TONE IN CHINESE



In Chinese, both syllable and tone are indispensable to describe a pronunciation. Syllable itself has no tonal property. Because Chinese tones are distinguishable. Tone can determine the information and meaning of a word in Chinese. It is necessary for me to reflect this attribute in the translation space.

As shown in the figure above, a tone has pitch changes during the pronunciation. The spatial characteristics should have a changing process as well. The pitch of tone is divided into five grades in phonetics. In this way, five levels can correspond to five colors. Finally, Chinese tones will be presented in space through the change of color.



High-level (mā)



High-rising (má)



Low-falling-rising (mă)



High-falling (mà)



Neutral tone(ma)

## 4.3 WORD STRESS IN ENGLISH

Word stress is a property of a syllable. In some languages, the stress of words indicates the emphasis on a syllable. In English, different stress positions will affect the part of speech and meaning. Take word 'record' for example, it means a thing constituting a piece of evidence about the past when it read like / 'reko:d/; When it takes  $/k_{2}$ : d/a s the stressed syllable, it becomes into a verb.

Generally, three levels of stress are distinguished from the strongest to the weakest: primary stress, secondary stress and unstressed. In English, the symbol ' is used to present primary stress and is used to present secondary stress. The release of stress enhances the change of muscles around vocal cords. This process can be translated into the change of wall thickness, which changes the sense of firmness of space.





'rekɔːd

rı 'kɔːd

#### 4.4 "ARCHITECTURE"

## 4.4.1 Chinese\_ 建筑 JiànZhù





SECTION 1





SECTION 2



SECTION 3

According to those methodologies, I can have the space of word architecture. Different parts of our cavity becoming walls, floors and ceilings in the space. Those elements seem blended. People can feel the shape change while walking through it.



PLAN 1

SECTION 4



#### **SECTION 5**

4.4.2 English\_ ARCHITECTURE /'a:kitektfə/



SECTION 1



SECTION 2





SECTION 3

PLAN 1



SECTION 4

#### SECTION 5

## **4.5 INTONATION IN UTTERANCE**



Intonation is the arrangement and change of pitch in a sentence. There are five basic intonations in English: rising, falling, rising-falling, falling-rising and flat. In addition to lexical meaning, a sentence also has intonation meaning, which is the attitude expressed by the speaker. The structure of intonation are complex, because it includes changes in the pitch, tempo, rhythm and intensity.

This project regards intonation as a collection of language emotions. The transparency of the material affects the experience of the space. Through the change of transparency, the emotion of language is translated into space. The increase in transparency marks the falling intonation. People lose their sense of privacy and security in a transparent space, just as the falling intonation often brings negative emotions.

The complete expression of intonation is actually similar to tone, which is a process of change. The trend of transparency is the key point of intonation presentation. This project will show the influence of five English intonations on the same space, so as to compare the emotional and spatial characteristics of different patterns.









**Rising Intonation** 

**Falling Intonation** 

#### **Rising-falling Intonation**

#### Falling-rising Intonation

#### Flat Intonation

## 5.1 Qiāng Jin Jiǔ 将进酒

'Qiāng Jin Jiŭ' (将进酒) is a poem created by Li Bai, a great poet in Tang Dynasty. The style of this poem imitates the Yuefu Poetry(乐府诗), which is a kind of poetry with strong musical sense rising in Han Dynasty.

> 将进酒 唐・李白 君不见黄河之水天上来,奔流到海不复回。 君不见高堂明镜悲白发,朝如青丝暮成雪。 人生得意须尽欢,莫使金樽空对月。 天生我材必有用,千金散尽还复来。 烹羊宰牛且为乐, 会须一饮三百杯。 岑夫子,丹丘生,将进酒,杯茣停。 与君歌一曲,请君为我倾耳听。 钟鼓馔玉不足贵, 但愿长醉不愿醒。 古来圣贤皆寂寞,惟有饮者留其名。 陈王昔时宴平乐, 斗酒十千恣欢谑。 主人何为言少钱,径须沽取对君酌。 五花马、千金裘, 呼儿将出换美酒,与尔同销万古愁。

The origin of ancient Chinese poetry can be traced back to the pre Qin period. The poetry before the Tang Dynasty can be called ancient poetry(古体诗), while the poetry of Tang and Song Dynasty is modern poetry(近体诗). Only in the Tang Dynasty did poetry develop into a strict antithesis( 对仗). These poems with the requirements of level and oblique tones( 平 仄) and antithesis can be classified as metrical poetry(格律诗).

According to the number of words, ancient Chinese poetry can be divided into five-character verse(五言) and seven-character verse(七言). This poem is mainly composed of seven-character verse, "broken" by some scattered sentences and short antithetical words (such as " 岑夫子 Cén fū zǐ, 丹丘生 dān qiū shēng", "五花马 Wǔ huā mǎ、千金裘 qiānjīn qiú"), whose rhythm and tempo changes rapidly and unrestrained.

An important feature of poetry is *rhyme* at the end of a sentence. Rhyme not only makes the syllables at the end of the sentence correspond to each other, but

also affects the rhythm and tempo of reading. Sentences with the same rhyme can be divided into one group, and different groups form spatial pause and turn. According to the rhyme group of this Tang poem, we can get the following space forms with various length and rhythm change.

君不见黄河之水天上来,	Jūnbujiàn l
奔流到海不复回。	bēnliúdàoh
君不见高堂明镜悲白发,	Jūnbujiàn g
朝如青丝暮成雪。	zhāorúqīng
人生得意须尽欢,莫使金樽空对月。	Rénshēngd
天生我材必有用,千金散尽还复来。	Tiānshēngv
烹羊宰牛且为乐,会须一饮三百杯。	Pēngyángz
岑夫子, 丹丘生,	Cénfūzĭ, da
将进酒, 杯莫停。	qiāngjìnjiŭ
与君歌一曲, 请君为我倾耳听。	Yŭjūngēyio
钟鼓馔玉不足贵, 但愿长醉不愿醒。	Zhōnggŭzh
古来圣贤皆寂寞, 惟有饮者留其名。	Gŭláishèng
陈王昔时宴平乐,	Chénwáng
斗酒十千恣欢谑。	dŏujiŭ shíq
主人何为言少钱,径须沽取对君酌。	Zhŭrénhéw
五花马、千金裘,	Wŭhuāmă,
呼儿将出换美酒,与尔同销万古愁。	hū'erijāngo

The phonemes and syllables of the whole poem have been listed above. Thay are grouped according to the rhyme and rhythm. These syllables are not just simple letters, but sets of spatial sequences connecting with each other. The use of words in poetry determines the order of space. Rhyme and rhythm determine the combination logic of each spatial sequence. Next, I will illustrate the application of the translation methodology I created in previous chapters and explain the design system for spatial generation controled by contexture in poetry.

huánghézhīshuĭ tiānshànglái, năi bufùhuí.

gāotángmíngjìng bēibáifà, gsī mùchéngxuě. léyì xūjìnhuān, mòshĭjīnzūn kõngduìyuè.

wŏcái bìyŏuyòng, qiānjīnsànjĭnhuánfùlái. zăiniú qiĕwéilè, huìxūyīyĭn sānbăibēi.

āngiūshēng, i, bēimòtíng. qū, qingjūnweiwo qīng'ertīng. huànyùbùzúguì,dànyuànchángzuìbuyuànxĭng. gxián jiējìmò,wéiyŏuyĭnzhě liúqímíng.

xīshí yànpínglè, iān zì huān xuè. vèi yánshǎoqián, jìngxūgūqŭ duìjūnzhuó.

qiānjīnqiú, chūhuànměijiů, yů'ěrtóngxiāowàngǔchóu.

53

#### 5.1.1 Spatial sequences shown in phonetic diagrams



6 <sup>®</sup> 6  $\sim$ 8 50 q a d **I** i er üan 55 5 0 <u>م</u> ° Bo C ou

#### 5.1.2 The combination of Spatial sequences

In practical application, the  $10 \times 10$  grid used in translation is 1 meter per grid. The phoneme diagrams are arranged in parallel one after another. The syllable structure of Chinese is simple and clear. The distance between consonants and vowels is 5 meters. The unit length of each syllable is 10 meters. The sliding distance from the black line to the blue line is 1.5 meters as same as from the blue line to the purple line. Through the curve lofting in the space, the phoneme diagrams are connected in series with walls. The space generated by the dynamic change of vocal tract shape is obtained.





Each group of space divided by rhyme is connected as a long walkway. And then the end of the walkway is lifted up 10 meters, so that the spatial sequence becomes a sloping ramp. Every rhyme means the pause of emotion or rhythm in the poem. These pause points make the spatial sequence turn, and finally get a spiral spatial direction.

Finally, intonation and tone change the transparency and color of materials. Such a group of poetry space has the overall coherence, but also has the turning point and the change of shape and length, which presents the rhythm and tempo of poetry in architectural language.

#### 5.2 SONNET FROM SHAKESPEARE

*Sonnet* is a kind of short lyric poem originated from Italian folk. It was popular in Europe at the beginning of the Renaissance. It has a very strict structure. It can be divided into two parts: the upper section is eight lines and the lower section is six lines. Each line has eleven syllables, and the rhymes are arranged as ABBA ABBA, CDC DED.

#### **SONNET**

William Shakespeare When forty winters shall besiege thy brow And dig deep trenches in thy beauty's field, Thy youth's proud livery, so gazed on now, Will be a tottered weed of small worth held: Then being asked where all thy beauty lies, Where all the treasure of thy lusty days, To say within thine own deep-sunken eyes Were an all-eating shame and thriftless praise. How much more prasie deserved thy beauty's use If thou couldst answer, 'This fair child of mine Shall sum my count and make my old excuse,' Proving his beauty by succession thine. This were to be new made when thou art old And see thy blood warm when thou feel'st cold.

Shakespeare's sonnets are more structured. He divided the fourteen lines into two parts: the first part is three groups of four lines, and the second part is two lines. Each line has ten syllables, in reading each second syllable for stress. The rhymes are arranged as ABAB, CDCD, EFEF, GG. The form of this kind of poem als belongs to metrical poem. This means that Shakespeare's Sonnets can be better divided into groups, and produce a more orderly spatial sequence with consistent length.

The phonemes and syllables of the whole poem have been listed on the right page. Thay are grouped according to the rhyme and rhythm. These syllables have the same function in English as syllables in Chinese . The difference lies in the spatial order generated according to different poetic forms. These differences

reflect the influence of poetry context (the contexture of site) on space in the process of translation. Next, I will illustrate the application of the translation methodology I created in previous chapters and explain the design system for spatial generation controled by it.

When forty winters shall besiege thy brow And dig deep trenches in thy beauty's field, Thy youth's proud livery, so gazed on now, Will be a tottered weed of small worth held:

Then being asked where all thy beauty lies, Where all the treasure of thy lusty days, To say within thine own deep-sunken eyes Were an all-eating shame and thriftless praise.

How much more prasie deserved thy beauty's use If thou couldst answer, 'This fair child of mine Shall sum my count and make my old excuse,' Proving his beauty by succession thine.

This were to be new made when thou art old And see thy blood warm when thou feel'st cold.

/wen//'fɔ:tɪ//'wɪntəz//ʃæl//bɪ'si:dʒ//ðaɪ//brau/ /ənd//dɪg//di:p//trentfiz//ɪn//ðaɪ//'bju:tɪz//fi:ld/, /ðai//ju:0s//praud//'livori/, /sou//geizd//pn//nau/, /wil//bi://ə//tptəd//wi:d//pv//smo:l//w3:0//held/:

/ðen/ /'bi:1ŋ/ /a:skt/ /weə/ /ɔ:1/ /ðaɪ/ /'bju:tɪ/ /laɪz/, /weə/ /ɔ:1/ /ðə/ /'treʒə/ /pv/ /ðai/ /'lʌsti/ /deiz/, /tə//sei//wið'in//ðain//əun//di:p//'sʌŋkən//aiz/ /wə//æn//ɔːl//'iːtɪŋ//ʃeɪm//ənd//'θrɪftlɪs//preɪz/.

/hau//matf//mo://preiz//di'z3:vd//ðai//'bju:tiz//ju:z/ /If/ /ðau/ /kudst/ /'a:nsə/, /ðis/ /feə/ /tʃaild/ /pv/ /main/ /fæl//snm//mai//kaunt//ond//meik//mai//ould//ik'skju:z/, /'pru:viŋ/ /hɪz/ /'bju:tɪ/ /baɪ/ /sək'seʃən/ /ðaɪn/

/ðis//wə//tə//bi://nju://meid//wen//ðau//a:t//əuld/ /ənd//si://ðai//blʌd//wɔ:m//wen//ðau//fi:lizd//kəuld/.

#### 5.2.1 Spatial sequences shown in phonetic diagrams

# $\bigcirc$ 9 d q d q ۲<u>ر</u>





#### 5.2.2 The combination of Spatial sequences

In practical application, the  $10 \times 10$  grid used in translation is 1 meter per grid. The phoneme diagrams are arranged in parallel one after another. The syllable structure of English is complex and diverse. The unit length of each syllable is controled in 10 meters. The distance between consonants and vowels is determined by the number of phonemes. The sliding distance from the black line to the blue line is 1 meter. Through the curve lofting in the space, the phoneme diagrams are connected in series with walls. The space generated by the dynamic change of vocal tract shape is obtained.





Each group of space divided by rhyme is connected as a long walkway. And then the end of the walkway is lifted up 10 meters, so that the spatial sequence becomes a sloping ramp. Every rhyme means the pause of emotion or rhythm in the poem. These pause points make the spatial sequence turn, and finally get a spiral spatial direction.

Finally, intonation and stress change the transparency and thikness of materials. Such a group of poetry space has the overall coherence, but also has the turning point and the change of shape and length, which presents the rhythm and tempo of poetry in architectural language.





#### 5.3 A MUSEUM OF POETRY

#### 5.3.1 Circulation in the museum

5.3.2 Organization of blocks



A long passage can be obtained by putting the two groups of spatial sequences, controled by ancient Chinese poems and Sonnets, together. It starts with the first syllable of the Chinese poem and ends with the last rhyme of the sonnet. Such a passage has built a loop in the space, which can become the circulation of visiting in the museum of poetry.



The building blocks are formed according to the position of the passages. Firstly, each group of the spatial sequence, within a uniform rhyme, can be contained in a 20-meter-hight box. Then, these boxes are stacked together according to the location of the circulation, resulting in some courtyards and gray space in different sizes. After adjustment, the final shape ensures the continuity and coherence of the circulation, as well as adds interest to space.

#### 4 COUNTYARD









SECTION 1

SECTION 2

#### SECTION 3



flow

I know,

half loved.

A state and a statements of the Court of the accord attain with allocinations. Some and accord attain the control of the produced in the action of the sole that I produced at the block falling adorp, I often become at a fait of one side conversation scatter, on its action of an mind, quite independently attained any mind, quite independently attained any mind, quite independently attained any mind. The attained any article attained any mind. The atta of any any article ed, assessments where, where the sills pheriomicroots of no importance to me. The sills pheriomicroots to be the sudiney counterpart of errtain mining visions which I also know well. What will that is one of the braves t upon the retinal rods by as are see thinker .

67

seross the viscal field.



## 6. DISCUSSION AND CONCLUSION

Translation is not a new conception, but cross-disciplinary communication can always trigger new inspiration. The main research question of this project is how to translate between architecture and language, so as to conclude a new design system. By studying the relevant knowledge of linguistics and phonetics, I tried to find a space that can convey linguistic information. This space represents the shape of sound, and contains emotions, attitudes and massages of utterances.

The project begins from the knowledge of phonetics and uses the shape of the vocal tract as the initial medium for language and space communication. As what Helen Keller wrote in '*Three Days to See*', she used her hands to feel the change in the mouth shape when speaking, in order to learn to speak and write. That means, the shape of the sound can be perceived by human through the change of mouth shape, and the concept of '*Phonetic alphabets of architecture*' gradually proposed from here.

Surprisingly, such a huge language system is actually based on a limited number of phonemes. Space limits the types of sound, and the structure of the human physical body dictates the limit of sound. However, through various combinations, human have created thousands of languages. Each language has a large number of vocabulary and its own grammar. Although the origin of language cannot be verified, it is undeniable that regional characteristics have played a role. Languages have similarities and differences with each other. All phonemes can be summarized in IPA, or they can be scattered around the world.

Isn't the situation same in architecture? By combining a limited number of prototypes in different ways, various styles of buildings are constantly emerging. These differences can affect the spacial order. They can also change the scale of the space, the manner of construction, the type and number of prototypes used for combination, and so on. These changes have created ever-changing spatial forms, guiding a variety of functions and usage methods. The addition ideas of materials enriches the feeling of space. Such a disciplinary structure makes architecture exhibit diverse properties, which is the reason why the discipline of architecture remains prosperous.

The logic of translation methodology proposed in this project corresponds to the structure of the language system: from *phonetic diagrams* to *syllable combinations*, then to the *color and thickness of 'words'*, and finally to form

*'sentences' with varying transparency*. From the perspective of architecture, this project proposes *a new design system*. It contains *the method of translating the prototype, the logic of the prototype combination*, and discusses the spatial changes caused by the different contexts of the site for *application*. The thesis also mentioned the understanding of the *'site'*. I think that the site does not only exist in reality. It can be a 'place' in a narrow sence, or it can be different parameters that affect the design in a broad sense. Using poetry as sites is an attempt of this project. The rhyme and rhythm of poetry are like sunlight and rain, which affect the shape of space.

From a linguistic point of view, there are more linguistic factors that can be considered in the system of translation. Studies on more levels of linguistics can be topics for further research, such as:

1 Reflect the evolution of thinking mode by studying the course of language evolution, in order to combine the research of architectural history, and pursue the direction and process of spatial evolution.

2 Studying the structure of text may lead to another design system.

*3 Various artistic expressions of language, in addition to poetry, there are prose, novels, songs, etc. When these language works are used as a site for design, what kind of context can be considered?* 

4 Each language has its own dialect system. By studying the differences between dialects and standard speaking, new spatial styles can be proposed.

In the end, I want to emphasize the magical power of '*difference*' in this project. The studies of linguistics and architecture have suggested that the way people understand the world is comparison. Black and white, high and low, solid and void, these concepts are all perceived through contrast. Because of the difference, we know whether we are drinking juice or cola; because of the difference, we know whether we see an elephant or an ant; because of the difference, we find the boundary between the sky and the sea; because of the difference, we have languages and architectural space.

## 7.1 STUDENT BACKGROUND



Master Program of Architecture and Urban Design Department of Architecture, Chalmers University of Technology, Gothenburg, Sweden

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#### The Architectural Design and Institute of Zhejiang University Co, Ltd (UAD)

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## 7.2 BIBLIOGRAPHY

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2020. [Figure 3.2.1] Available at: <a href="https://en.wikipedia.org/wiki/International">https://en.wikipedia.org/wiki/International</a> Phonetic Alphabet> 2020. [Figure 3.3.1] Available at: <a href="https://en.wikipedia.org/wiki/International">https://en.wikipedia.org/wiki/International</a> Phonetic Alphabet>

谢谢 *TACK*  **THANK YOU** <sup>감사합니다</sup> *GRAZIE ありがとう DANKE GRACIAS*  **MERCIE** *Dankon*