

**AN EXO-SKELETAL ANALYSIS OF COMPLEX-PATH MOTION
PREDICATES IN TAIWAN MANDARIN**

by
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A Dissertation

*Submitted to the Faculty of Purdue University
In Partial Fulfillment of the Requirements for the degree of*

Doctor of Philosophy



Department of Linguistics
West Lafayette, Indiana
August 2021

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Dedicated to Koli Chen and Baomei Shieh, who gave me language

ACKNOWLEDGMENTS

The event of writing this dissertation has finally come to an end. This would not have happened without the following people in my life:

My advisor, Dr. Elena Benedicto, has been extremely helpful and patient with me during this journey. If I know anything about syntax, she is the person who I learned it from. Her emphasis on scientific thinking and formal rigor has had a tremendous impact on my intellectual growth since the first day I set foot in her syntax class back in 2015. The guidance and care she provided for her students went way beyond the classroom, and I don't think it is possible to overstate how important she has been to me as a role model—someone who shows me how to do research, to teach, to be somebody's mentor, to raise awareness of social issues, and to enjoy life at the same time.

I am also deeply grateful to the rest of my committee—Dr. Elaine Francis, Dr. Mary Niepokuj, and Dr. Alice Chi-Ying Wang—for their helpful comments on this dissertation and words of encouragement. I further thank Elaine and Mary for teaching me experimental syntax and phonology. You are wonderful teachers. To Alice, I thank her for inviting me for a coffee at Greyhouse when I first arrived at Purdue. I had only been in this town for a few days, and you already made it feel like home.

The people I met at the IELLab—Kwaku, Neda, René, Brittlea, Xuan, and others—have been an extremely important part of my academic and social life at Purdue. The collaborative work we have had in this lab has contributed greatly to the ideas laid out in this dissertation, and more importantly, I will never forget the fun we have had in these past several years.

Finally, I want to thank my family. I would not have decided to go to graduate school if it were not for my parents, Koli Chen and Baomei Shieh. At a young age, I learned from these two academics the importance of knowledge and what it is like to spend a lifetime searching for it. My sister, Rui-Hsi Chen, has been extremely helpful by commenting on many of the Mandarin sentences used in this work. Although she is not a linguist, her valuable input has provided a strong

basis for many of the arguments made here. Lastly, I want to thank my girlfriend, June Liu, who is the one that recommended Purdue to me. If it were not for her, I would not have come to this little Midwestern town called West Lafayette, and I would not have had this wonderful journey with so many wonderful people here. The process of writing this dissertation has been stressful to June as well, and I am exceedingly grateful for her patience and perseverance!

Thank you all!

TABLE OF CONTENTS

LIST OF FIGURES	11
LIST OF ABBREVIATIONS.....	13
CHAPTER 1. INTRODUCTION	14
1.1 Introduction	14
1.2 Goal	14
1.3 A Brief Background to the Study	15
1.4 Background to the Hypothesis.....	17
1.5 Hypothesis	18
1.5.1 The Bound-Variable Test	21
1.5.2 WH-Extraction	23
1.5.3 The Reflexive Test	25
1.5.4 Other Evidence	29
1.6 Concluding Remarks and Organization of the Dissertation	30
CHAPTER 2. THEORETICAL FRAMEWORK & ITS BACKGROUND	32
2.1 Introduction	32
2.2 The Exo-Skeletal Model (XSM)—An Alternative to the Lexicalist Approach	32
2.3 The Basics of XSM: Functional Projections—The Core of Grammar.....	35
2.4 The Basics of XSM: Range Assignment to Functional Heads	36
2.5 The Basics of XSM: What is a Root?.....	39
2.6 A Few Notes on the Application of XSM to Motion Predicates	41
2.7 Conclusions	46
CHAPTER 3. METHODOLOGY	47
3.1 Introduction	47
3.2 Data Collection Instrument.....	47
3.2.1 Trajectory / Path	48
3.2.2 Telicity.....	49
3.2.3 Agentivity	51
3.2.4 Boundary Crossing.....	52
3.3 Participants and Data Collection	53

3.3.1	Participants	53
3.3.2	Data Collection Process.....	54
3.3.3	Data Collected	54
3.4	Data Processing	56
3.4.1	Naming Conventions.....	56
3.4.2	ELAN Files.....	57
3.5	Other Sources of Data	59
3.6	Conclusions	59
CHAPTER 4. PATH.....		60
4.1	Introduction	60
4.2	Complex Path: 3-D Vectorization	61
4.3	Patterns in the Data.....	63
4.3.1	One-Dimensional Path—Horizontal Only	64
4.3.1.1	Pattern 1: Horizontal + XP-Loc.....	65
4.3.1.2	Pattern 2: Deictic	65
4.3.1.3	Pattern 3: Horizontal + Deictic.....	66
4.3.1.4	Pattern 4: Vertical + Deictic	67
4.3.1.5	Pattern 5: Ingressive / Egressive + Deictic.....	68
4.3.1.6	Pattern 6: Ingressive / Egressive	69
4.3.1.7	Pattern 7: <i>Dao</i> (“arrive”) + XP-Loc	71
4.3.1.8	Pattern 8: (Post-Manner-V) Directional Phrases.....	72
4.3.1.9	Pattern 9: (Pre-Manner-V) Orientational Phrases	73
4.3.1.10	Pattern 10: Manner-V + be-at + XP-Loc.....	75
4.3.1.11	Pattern 11: Manner-V	76
4.3.2	One-Dimensional Path—Vertical Only.....	76
4.3.2.1	Pattern 1: <i>Qi</i> (“rise”).....	77
4.3.2.2	Pattern 2: <i>Xia</i> (“go-down”).....	78
4.3.2.3	Pattern 3: Vertical + Deictic	79
4.3.2.4	Pattern 4: Ingressive + Deictic	81
4.3.2.5	Pattern 5: Ingressive + XP-Loc	82
4.3.2.6	Pattern 6: <i>Dao</i> (“arrive”) + XP-Loc	82

4.3.2.7	Pattern 7: <i>Shang</i> (“get onto”) + XP-Loc	84
4.3.2.8	Pattern 8: (Pre-Manner-V) Orientational Phrases	84
4.3.2.9	Pattern 9: Manner-V + be-at + XP-Loc	85
4.3.2.10	Pattern 10: Manner-V	86
4.3.3	Two-Dimensional Path—Horizontal and Deictic	86
4.3.3.1	Pattern 1: Horizontal + Deictic	88
4.3.3.2	Pattern 2: Deictic	89
4.3.3.3	Pattern 3: <i>Xia</i> (“go-down”)	89
4.3.3.4	Pattern 4: Horizontal + XP-Loc	90
4.3.3.5	Pattern 5: Vertical + Deictic	91
4.3.3.6	Pattern 6: Ingressive / Egressive + Deictic	92
4.3.3.7	Pattern 7: Ingressive + XP-Loc	93
4.3.3.8	Pattern 8: <i>Dao</i> or <i>Zhi</i> (“arrive”) + XP-Loc	94
4.3.3.9	Pattern 9: (Post-Manner-V) Directional Phrases	94
4.3.3.10	Pattern 10: (Pre-Manner-V) Orientational Phrases	95
4.3.3.11	Pattern 11: V + be-at + XP-Loc	95
4.3.3.12	Pattern 12: Manner-V	96
4.3.4	Two-Dimensional Path—Vertical and Horizontal	96
4.3.4.1	Pattern 1: Deictic	97
4.3.4.2	Pattern 2: Horizontal + Deictic	98
4.3.4.3	Pattern 3: Vertical + Deictic	98
4.3.4.4	Pattern 4: Egressive + Deictic	98
4.3.4.5	Pattern 5: Ingressive + XP-Loc	99
4.3.4.6	Pattern 6: <i>Dao</i> (“arrive”) + XP-Loc	99
4.3.4.7	Pattern 7: <i>Shang</i> (“get-onto”)	99
4.3.4.8	Pattern 8: (Pre-Manner-V) Orientational Phrases	100
4.3.4.9	Pattern 9: Manner-V + be-at + XP-Loc	100
4.3.5	Three-Dimensional Path	101
4.3.5.1	Pattern 1: Vertical + XP-Loc	103
4.3.5.2	Pattern 2: Horizontal + XP-Loc	105
4.3.5.3	Pattern 3: Deictic	105

4.3.5.4	Pattern 4: Horizontal + Deictic	106
4.3.5.5	Pattern 5: Vertical + Deictic	106
4.3.5.6	Pattern 6: Egressive + Deictic	107
4.3.5.7	Pattern 7: Ingressive / Egressive	107
4.3.5.8	Pattern 8: <i>Dao</i> (“arrive”) + XP- _{Loc}	108
4.3.5.9	Pattern 9: <i>Shang</i> (“get-onto”) + XP- _{Loc}	109
4.3.5.10	Pattern 10: (Post-Manner-V) Directional Phrases	110
4.3.5.11	Pattern 11: (Pre-Manner-V) Orientational Phrases	111
4.3.5.12	Pattern 12: V + be-at + XP- _{Loc}	112
4.3.5.13	Pattern 13: Manner-V	112
4.3.6	Systematization of the Patterns Across Dimensions	113
4.4	PATH and MANNER as Distinct Components	117
4.4.1	Evidence from the Syntax of the Outer Aspect Marker <i>-Le</i>	117
4.4.2	Other Evidence	121
4.5	The Problem of PATH	123
4.5.1	Solution: Overview	124
4.5.1.1	Solution—Part 1: Variable Binding of { <i>x</i> }	126
4.5.1.2	Solution—Part 2: Finding an Anchor in Space	135
4.5.1.3	The “Exception” Cases and Additional Predictions	141
4.6	Some Speculative Remarks on Learnability	146
4.7	Conclusion	148
CHAPTER 5.	TELICITY	149
5.1	Introduction	149
5.2	What is Telicity?	150
5.3	Conditions for Telicity in Motion Predicates	151
5.3.1	The AspQ Projection	151
5.3.2	Verb of ARRIVING	156
5.3.3	Range Assigners Other Than <i>Dao</i>	162
5.3.3.1	<i>Zhi</i> (“Arrive”)	163
5.3.3.2	<i>Jin</i> / <i>Ru</i> (“Enter”) and <i>Chu</i> (“Exit”)	164
5.3.3.3	<i>Guo</i> (“crossing”)	167

5.3.3.4	<i>Shang</i> (“Get Onto”)	168
5.4	Quantity Internal Arguments in Motion Predicates and Case Markings in Finnish.....	169
5.5	Conclusion	171
CHAPTER 6. CONCLUSION.....		172
6.1	Wrapping Up	172
6.2	Areas for Future Research	174
APPENDIX A. DATA.....		175
APPENDIX B. ANIMATED PROMPTS USED FOR ELICITATION		267
REFERENCES		277

LIST OF FIGURES

Figure 3.1: User interface of the software	47
Figure 3.2: Example of an animated video clip	48
Figure 3.3: A bird going up.....	49
Figure 3.4: A bird coming down.....	49
Figure 3.5: A bird reaching the tree top (telic)	50
Figure 3.6: A bird flying toward the tree top without reaching it (atelic, underspecified)	50
Figure 3.7: A bird flying away (atelic, unspecified)	50
Figure 3.8: A boy carrying a goose (agentive)	51
Figure 3.9: A goose moving on its own (non-agentive)	51
Figure 3.10: Agentive, initial contact	51
Figure 3.11: Agentive, continuous contact	52
Figure 3.12: A figure crossing a boundary	53
Figure 3.13: No boundary on the path	53
Figure 3.14: Example of an ELAN file.....	58
Figure 4.1: Prompt 05-01	67
Figure 4.2: Prompt 05-04.....	68
Figure 4.3: Prompt 15-05	68
Figure 4.4: Prompt 11-05	78
Figure 4.5: Prompt 10-12.....	83
Figure 4.6: Prompt 06-03.....	88
Figure 4.7: Prompt 08-01	92
Figure 4.8: Prompt 05-06.....	93
Figure 4.9: Prompt 13-01	104
Figure 4.10: Prompt 06-16.....	104
Figure 4.11: Prompt 06-08.....	109
Figure 4.12: Prompt 06-03	114
Figure 4.13: Prompt 12-01	115

Figure 4.14: Prompt 13-06.....	128
Figure 4.15: Two apples falling down on both sides of the speaker.....	129
Figure 4.16: Illustration of (222). Arrows indicate the enemies' motion.	130
Figure 4.17: Logically possible scenarios for (222). Arrows indicate the enemies' motion.	130
Figure 4.18: Two birds moving horizontally toward a plane (Stick figure for scale and orientation)	132
Figure 4.19: A bird's-eye view of an egressive event	133
Figure 5.1: Prompt 15-6, depicting a nail being hammered into a cube	157
Figure 5.2: Atelic motion event denoted by prompt 6-3.....	161
Figure 5.3: Prompt 7-7	164
Figure 5.4: Prompt 10-2	165
Figure 5.5: Prompt 2-11	167
Figure 5.6: Prompt 11-3	168

LIST OF ABBREVIATIONS

1 st	First Person
2 nd	Second Person
3 rd	Third Person
ACC	Accusative Case
BEI	Passive Marker
CL	Classifier
GEN	Genitive Marker
IMP	Imperfective Aspect
NEG	Negation Marker
PFV	Perfective Aspect
PL	Plural
PROG	Progressive Aspect
PRT	Partitive Case
SG	Singular
VCL	Verbal Classifier

CHAPTER 1. INTRODUCTION

1.1 Introduction

This dissertation provides a syntactic analysis of motion predicates in the variety of Mandarin spoken in Taiwan, using a generative-constructionist theoretical framework called the Exo-Skeletal Model (XSM) (Borer 2005a; Borer 2005b; Borer 2013). Although previous studies have investigated motion predicates from typological (e.g., (Talmy 2000)), diachronic (e.g., (Chor 2018)), and purely descriptive (e.g., Chen 2010) perspectives, few have given a comprehensive account of the multiple sub-components of these predicates and the different properties they have. Even fewer have attempted to analyze how motion predicates are structured in a Serial Verb Construction (SVC) language such as Mandarin. These few include Benedicto & Salomón (2014) on Mayangna, Zheng (2012, 2015) on SwaTawWe, Cantonese, and Mandarin, Osei-Tutu (2019) on Ghanaian Student Pidgin, and Taherkhani (2019) on Tati. It goes without saying that much work is still needed before we can paint a complete picture of how motion events are grammatically represented in the mind. The present study, therefore, will contribute to this line of research by addressing questions left unanswered by the aforementioned studies. It is hoped that this work will refine the existing analysis of the grammar of motion predicates, and that by doing so, we will be one step forward toward an explanatory account of such grammar. Furthermore, perception of motion is a universal human experience that is undoubtedly underpinned by certain innate cognitive modules. A study on motion predicates thus provides a significant steppingstone to exploring how the language faculty (which must also have **some** innate specifications) interacts with those cognitive modules, thereby shedding light on the nature of our linguistic capacity.

1.2 Goal

The goal of this dissertation is to refine the existing formal accounts of the syntax of motion predicates in Mandarin, specifically those found in Zheng (2015) and Chen (2017), thereby providing answers to the question of how motion events are syntactically represented in Language. In particular, this work will be primarily focused on two aspects: The first one is how the path component is structurally configured in Mandarin and what syntactic constraints it exhibits. The second one is how telicity obtains in Mandarin motion predicates. Although this dissertation shares

the same overarching theme with those previous works, in some places it provides important updates and new analysis of the same puzzles.

1.3 A Brief Background to the Study

Different languages express motion events in different ways. Among the works that have investigated this topic, Talmy's (2000) is perhaps the most notable. He analyzes motion events from a typological and cognitive-semantic perspective by dissecting them into several basic semantic elements, such as **Figure**, **Ground**, **Path**, **Motion**, **Manner**, and **Cause** (Talmy 2000, p. 21) and examining what semantic elements are expressed by what surface elements, such as verb, adposition, subordinate clause, and satellite. (A satellite is a "grammatical category of any constituent other than a nominal or prepositional-phrase complement that is in a sister relation to the verb root (p. 222).") This analysis leads to his well-known two-way typology that distinguishes between verb-framed languages, which express a path of motion with a main verb, and satellite-framed languages, which do so with particles, verb prefixes, verb complements, etc. Mandarin is classified as a satellite-framed language by Talmy (2000, p. 222), but there have been several studies claiming otherwise (e.g., Tai 2003, Xu 2008, among others). Later work (e.g., Slobin (2004), Zlatev and Yangklang (2004), among others) augmented this typology by introducing a third class of equipollently-framed languages, in which manner and path are coded by equivalent grammatical forms.

Also relevant to the present study are works by Vendler (1967) and many others (e.g., Ryle 1949, Kenny 1963), which, building upon Aristotle's work (1984), classify verbs into different categories based on their inner aspectual properties. Most notable are Vendler's (1967) four categories: **Activity** (e.g., *run*, *walk*), **State** (e.g., *know*, *believe*), **Accomplishment** (e.g., *drown*), and **Achievement** (e.g., *find*). These classes of verbs differ in terms of the temporal structures of the events they denote (sometimes termed *Aktionsart* in the literature). For instance, activities and states do not have an inherent point in time at which a change of state occurs, whereas accomplishments and achievements do. Importantly, by classifying verbs in such a way, this approach takes the view that a verb inherently encodes information about its inner aspectual properties. In a similar vein, Rappaport Hovav & Levin (2010) classify verbs of motion into several categories based on scalar properties, such as **Non-Scalar Change** (e.g., *fly*), **Open Scale** (e.g., *recede*), **Multi-Point Closed Scale** (e.g., *return*), and **Two-Point Closed Scale** (e.g., *enter*). In an

attempt to explain the distribution patterns of motion verbs in Mandarin, Lin (2015a, 2015b, 2019) uses the above categories to classify Mandarin motion verbs and proposes that the order of verbs in Mandarin motion predicates must be constrained by their scalar properties.

In contrast to the lexicalist views outlined above, a generative-constructionist view attributes various semantic properties of a verb to its syntactic environment. For example, a verb has an Accomplishment reading not because there is something inherent in its meaning that qualifies it as such, but because it is embedded in a syntactic structure that has, say, a resultative phrase. Certainly, the semantic classifications from previous studies are still of great importance, for they have pointed out several key features / components of events, paving the way for the identification of various syntactic structures / components. Take Ramchand (2008) for example, who has linked Activity to the existence of a Process Phrase (*procP*) and Achievement to a Result Phrase (*resP*). Similarly, Borer (2005b) has proposed that telicity in Achievement and Accomplishment events comes from a piece of syntactic structure she calls AspQ Phrase.

This dissertation analyzes motion predicates along the lines of Borer (2005a, 2005b, 2013), Ramchand (2008), Benedicto & Salomón (2014), Osei-Tutu (2019), Taherkhani (2019) and Zheng (2012, 2015), who adopt a generative-constructionist approach and treat various components of an event as represented by different pieces of syntactic structure. Specifically, motion predicates are decomposed into several syntactic sub-components, such as Manner, Path, Endpoint, etc (see also Chiang 2013, pp. 837-838). These sub-components, in turn, are layered in a complementation structure described in Larson (1988), which was later applied to Serial Verb Constructions (Larson, 1991). Mandarin in particular has been analyzed by Chen (2017) as comprising three verb phrases—Manner VP, Path VP, and Endpoint VP—in a complementation, hierarchical order, linearly illustrated in sentence (1) below. The mono-eventive motion predicate in (1) is divided into three major components, and as will be shown in sections 1.4 and 1.5, they form a Serial Verb Construction (SVC), with one component c-commanding another. Before turning to the details of the components' syntactic structures, a little background information on SVCs is in order.

- “Father walked up to the third floor.”

In a discussion on verb serialization, Larson (1991) points out that three different types of proposals have been put forward: **Coordination**, **Adjunction**, and **Complementation**. What is perceived on the surface as an SVC may in fact be one or another of these structures underlyingly. As mentioned earlier, the present work takes the view that the overall structure of motion predicates in Mandarin has a complementation structure, which Larson (1991) has suggested can be used to analyze object-oriented depictive predicates in non-SVC languages, such as English. In (2), for example, the sentence “Carol rubbed her finger raw” has the underlying structure below:

VP
NP V'
Carol V VP
e NP V' AP
her finger rub raw

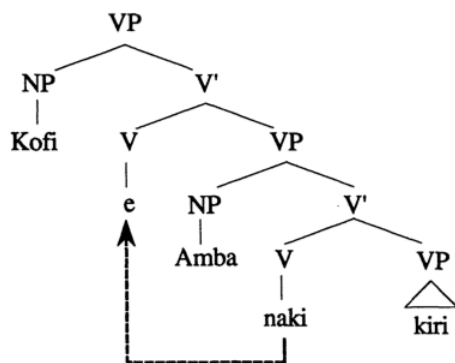
According to Larson's account, *her finger* receives a theta-role from *rub* (the primary predicate) and another theta-role from *raw* (the secondary predicate). Thus, he reasons, *rub* and *raw* must form a constituent that is predicated of *her finger* (p. 202). As for the V-to-V movement,

<https://sowhc.sow.org.tw/html/photo02/99photo/dasanba/990411/990411.htm>

Larson (1988) proposes that *rub* has to assign its external theta-role to *Carol*, and in order to do that, *rub* needs to move to the upper V. From this perspective, then, an SVC language such as Sranan employs essentially the same complementation structure for an object-oriented secondary predicate. The only difference is that the secondary predicate is realized as a VP instead of an AP, hence the series of verbs:

- (3) Kofi naki Amba kiri.
 Kofi hit Amba kill
 “Kofi struck Amba dead.” (Larson, 1991)

(4)



(Larson, 1991)

The Larsonian VP-shells analysis has also been applied to the double-object construction, in which the direct object occupies the specifier of the lower VP, whereas the indirect object is embedded inside a constituent (which may be a PP or another VP) that is sister to the lower V (Larson, 1988):

- (5) [_{VP1} Mary [_{V1'} gave [_{VP2} the book [_{V2'} gave [_{PP} to John]]]]].

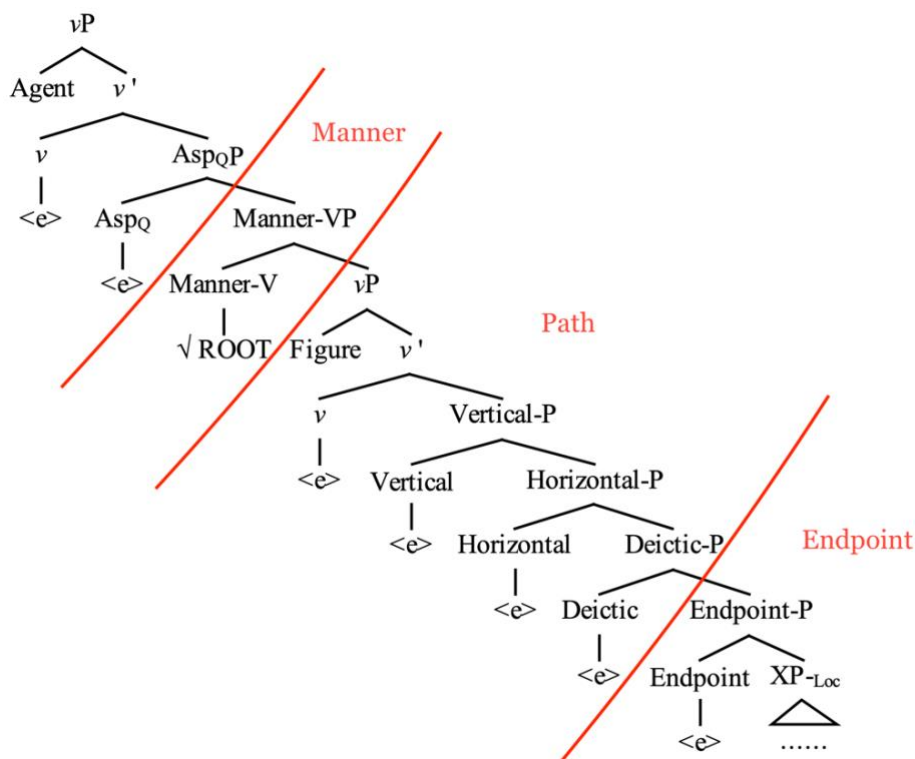
Later on, the higher VP was re-analyzed by Chomsky (1995) as a functional projection termed little *vP*, and by Kratzer (1996) as voice, whose primary function is to introduce an external argument with an Agent or Causer role.

1.5 Hypothesis

Combining the insight from Larson’s works (1988, 1991) and the generative-constructionist idea that components of an event are represented as pieces of syntactic structure, I propose that

motion predicates in Mandarin have the following hierarchical structure. (For simplicity, the tree diagram below does not include functional projections for outer aspect (AspP), tense (TP), and the existential closure (EP). They will only be included when they become relevant to my analysis.)

(6)



Pending further elaboration, we note that the structure above is very similar to those proposed by Zheng (2015), Osei-Tutu (2019), Benedicto & Salomón (2014), Chen (2017), and Taherkhani (2019) in that it has a complementation structure, with one head taking the maximal projection of another head as its complement, rather than as an adjunct or conjunct. A notable departure from the previous accounts, however, is that the heads in this tree are all radically empty. In other words, what is presented here is only the skeleton of a motion predicate, which needs to be “fleshed out” by language-specific elements in language-specific ways. This point will be elaborated in Chapter 2 when the Exo-Skeletal Model is introduced. For now, a tree diagram of sentence (1) (reproduced below as (7)) is provided, with certain details omitted for simplicity.

of ACROSS, UP, DOWN, COME, and GO. Second, the Endpoint Component has an Endpoint Phrase (**End-P** henceforth), which denotes arrival at an endpoint in a motion event. The head of End-P plays an important role in giving rise to motion telicity, though as will be argued in Chapter 5, not all motion predicates with telic readings have an End-P. This point will become evident after we present a formal definition of telicity. Finally, the Manner Component (**MANNER**) denotes the manner in which a Figure undergoes motion, such as *flying*, *swimming*, *walking*, etc. Note that despite their salient semantic association with motion, manner verbs by themselves do not entail the presence of PATH, which, recall, denotes the occurrence of translational motion. Mandarin manner verbs like *fei* (“fly”) and *zou* (“walk”), for example, can be used to describe events of flying in-situ like a hummingbird or of walking in circles and repeatedly ending up at the starting point. These cases are outside the scope of our discussion.

With this basic understanding of the general structure in mind, let us now turn to the evidence that the structure in (6) is complementation in the sense of Larson (1991), rather than coordination or adjunction.

1.5.1 The Bound-Variable Test

The premise of the bound-variable test is that a DP headed by a quantifier, such as *mei* (“every”), needs to c-command a variable in order to bind it. In (9), *ta* can be interpreted as a variable bound by *mei ge ren* (“everyone”), and the resulting interpretation of the sentence is that Wright designed more than one house, one for each person who asked him:

- (9) [Mei ge ren] qing Laite sheji ta de fangzi.
 Every CL person ask Wright design 3rd GEN house
 “[Everyone] asked Wright to design his house.”

- (10) Laite [gengju mei ge ren de xuqiu]
 Wright according-to every CL person GEN needs

hua-le ta de shejitu.
 draw-PFV 3rd GEN plan

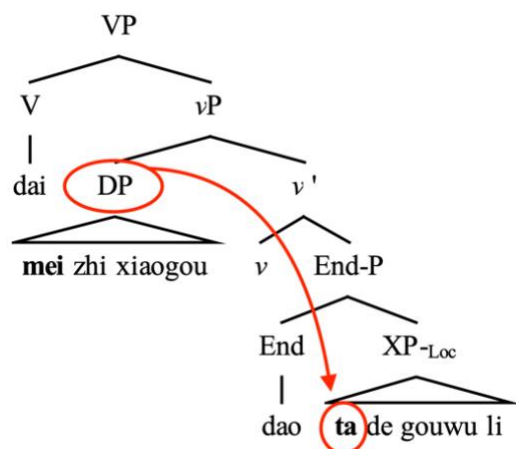
“Wright drew up his plan [according to everyone’s needs].”

In contrast, (10) does not have the reading that Wright drew up one plan for each person in the set denoted by *mei* (“every”) because the DP headed by the quantifier is inside an adjunct (the bracketed portion of the sentence) and cannot c-command *ta*. If motion predicates in Mandarin have a complementation structure instead of an adjunction or coordination structure, binding should not be a problem. The prediction is borne out by the sentence below, which can have a reading that each doggie in the set denoted by *mei* (“every”) is brought to its corresponding doghouse:

- (11) Wo yao dai [**mei** zhi xiaogou] dao **ta** de gouwu li.
 1st want take every CL small-dog arrive 3rd GEN doghouse inside
 “I want to take [every doggie] to its doghouse.”

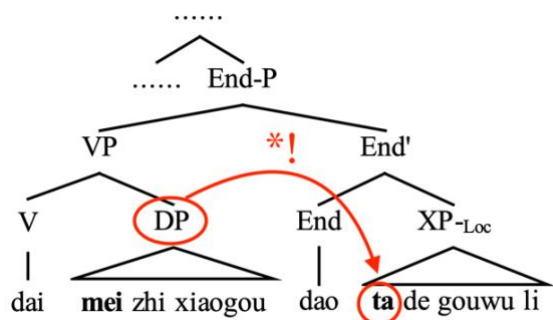
To be specific, the complementation structure of sentence (11) looks like (12), with *mei zhi xiaogou* (“every doggie”) as the Figure, occupying the specifier of a *vP*, as hypothesized in (6). The c-command relationship can be clearly established in this structural configuration, hence the predicted acceptability of sentence (11).

(12)



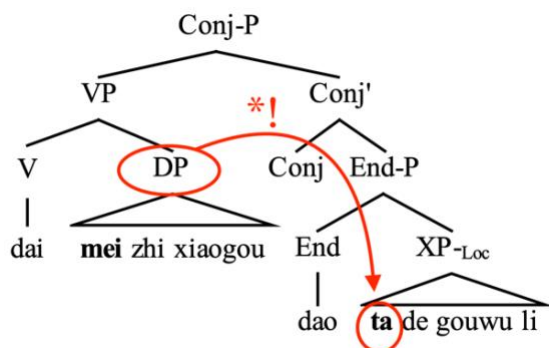
Furthermore, from the two trees below, it is easy to see why adjunction and coordination structures should be ruled out. If (11) had an adjunction structure, it would look like the tree in (13), where the DP headed by the quantifier is so deeply embedded in the VP that it cannot c-command the variable. But since the variable reading of *ta* in sentence (11) is available, (13) cannot be the right structure.

(13)



Similarly, if (11) had a coordination structure, it would have the configuration in (14). Here, again, the DP headed by *mei* is also unable to bind *ta* because a c-command relation cannot be established. Since (14) makes the wrong prediction, it should be ruled out.

(14)



1.5.2 WH-Extraction

The premise of this test is that wh-extraction out of one conjunct is unacceptable in a coordination structure (Aboh, 2009). To illustrate, consider the following sentence with two coordinated VP's, and keep in mind that Mandarin is a wh-in-situ language with covert wh-movement (Huang 1982a, 1982b):

- (15) Shengbing shi yao anshi [xiuxi] [chi yao].
 Sick when must on-time rest eat medicine
 “When you are sick, you must [rest] and [take medicines] on time.”

If the object of the second VP conjunct turns into a wh-word and undergoes covert movement, the resulting sentence is ungrammatical (see (16)). Similarly, covert wh-movement out of the first conjunct of a coordination sentence is equally unacceptable (see (17) and (18)).

- (16) *Shengbing shi yao anshi [xiuxi] [chi **shenme**]?
 Sick when must on-time rest eat what
 *‘‘What_i do you need to [rest] and [take t_i] on time when you are sick?’’

- (17) Xiaoming xihuan [chou xuejia] [he hongjiu].
 Xiaoming like smoke cigar drink red-wine
 ‘‘Xiaoming likes to [smoke cigars] and [drink red wine].’’

- (18) *Xiaoming xihuan [chou **shenme**] [he hongjiu]?
 Xiaoming like smoke what drink red-wine
 *‘‘What_i does Xiaoming like to [smoke t_i] and [drink red wine]?’’

If Mandarin motion predicates had a coordination structure, covert wh-movement should be ungrammatical. Since the following sentences are acceptable, we can safely rule out coordination as a possible structure. Specifically, (19) shows that *tui shenme* and *guo qu* cannot be two conjuncts (i.e., *[tui shenme][guo qu]); (20) shows that path and Endpoint cannot be coordinated (i.e., *[lai][dao shenme difang]); (21) rules out the possibility that manner and path are coordinated (i.e., *[fei][guo shenme]).

- (19) Ta [tui [**shenme** [guo qu]]]?
 3rd push what cross go
 ‘‘What_i did s/he push t_i across?’’
- (20) Women [lai [dao-le **shenme difang**]]?
 1st-PL come arrive-PFV what place
 ‘‘Where have we arrived?’’

(21) Xiaoniao [fei [guo-le **shenme**]]?

Small-bird fly cross-PFV what

“What_i did the birdie fly across t_i?”

1.5.3 The Reflexive Test

The premise of the reflexive test is that a reflexive pronoun needs to be co-indexed with a DP that c-commands it (Crain et al., 2005). This principle applies to the compound reflexives in Mandarin (Huang et al. 2009), as shown in the following examples:

(22) Xiaohui_i cha dao-le ta ziji_i de fenshu.

Xiaohui look-up arrive-PFV 3rd self GEN grade

“Xiaohui_i looked up her_i own grade.”

(23) *Ta ziji_i cha dao-le Xiaohui_i de fenshu.

3rd self look-up arrive-PFV Xiaohui GEN grade

*“Herself_i looked up Xiaohui’s_i grade.”

(24) [[Xiaohui]_i de mama]_j cha dao-le ta ziji_i de fenshu.

Xiaohui GEN mother look-up arrive-PFV 3rd self GEN grade

“Xiaohui’s mother looked up her own grade.”

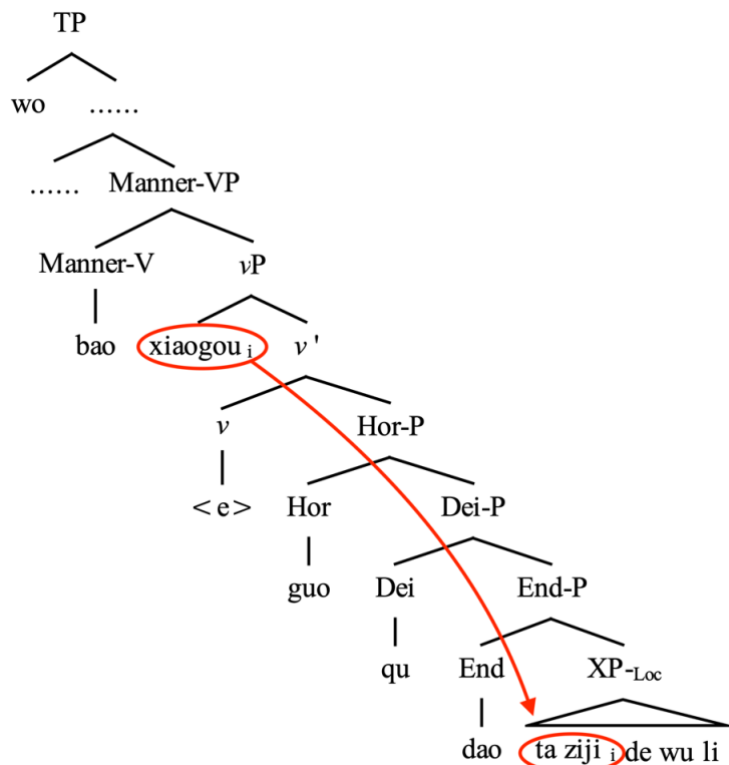
In (22) and (23), the compound reflexive *ta ziji* is co-indexed with the DP *Xiaohui*, but only (22) is grammatical because the DP c-commands the reflexive. In (23), the reflexive c-commands the DP, and therefore the sentence is ungrammatical. Crucially, not every DP that linearly precedes a compound reflexive can function as its antecedent. *Xiaohui* in (24), though linearly preceding the reflexive, clearly cannot be the antecedent because it is embedded inside the DP *Xiaohui de mama* and thus unable to c-command *ta ziji*. Hierarchical relation, no doubt, plays the decisive role in determining whether an antecedent and a compound reflexive can be co-indexed.

If Mandarin motion predicates have a complementation structure as I hypothesized, we should predict that a DP can function as an antecedent and be co-indexed with a compound reflexive in an XP-_{Loc} (i.e., a locative phrase). To be concrete, consider the following sentence:

- (25) wo bao xiaogou_i guo qu dao ta ziji_i de wu li.
 1st hold small-dog cross go arrive 3rd self GEN house inside
 “I carried the doggie over to its own house.”

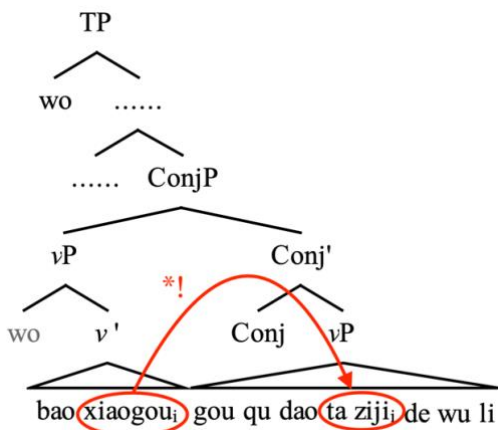
According to the complementation structure hypothesized in (6), the sentence above has the structural configuration in (26), in which *xiaogou* (“doggie”), the Figure, occupies the specifier of the *v*P immediately below Manner-V. Since *xiaogou* c-commands *ta ziji* (“3rd self”) in this structure, (26) predicts that the two elements can be co-indexed. This prediction is borne out.

- (26) Co-indexation is possible because the reflexive is c-commanded by the antecedent.



The reflexive test should dispel any reasonable doubt that motion predicates have a coordination structure. A structure with coordinated VP's would not be possible, for there is no way *xiaogou* could c-command the compound reflexive in that kind of configuration:

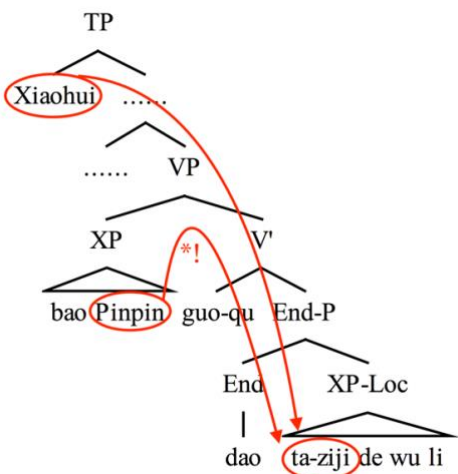
(27)



Let us now consider the possibility of an adjunction structure. As noted by Ernst (2014), the vast majority of adjuncts in Mandarin are pre-verbal. Thus, if a motion predicate has an adjunction structure, the most likely candidate for the adjunct is manner, or a constituent that contains both manner and path. Below is a sentence with a hypothetical adjunct in brackets:

- (28) Xiaohui [bao Pinpin] guo qu dao ta ziji de wu li.
 Xiaohui hold Pinpin cross go arrive 3rd self GEN house inside
 ‘Xiaohui went over to her own house while holding Pinpin in her arms.’

(29)



Setting categorial labels aside, the tree above shows the most reasonable adjunction structure one could come up with. Here, manner appears as a sister of some V' that contains the rest of the predicate. Importantly, the object, *Pinpin*, clearly cannot c-command the compound reflexive in this case, and one would predict that *ta ziji* can only refer to the subject, *Xiaohui*. This is obviously

the wrong prediction, for object co-indexation is a perfectly licit interpretation of this sentence, just as it is in (25). It would not help, either, to have a constituent that contains both manner and path as an adjunct modifying End-P because the object would still be deeply embedded, unable to c-command the reflexive. The inevitable conclusion is that motion predicates like the ones in (25) and (28) do not have an adjunction structure.

For the sake of completeness, however, it should be reported that in certain contexts, Mandarin does seem to allow a verb phrase to function as an adjunct that modifies a motion event, similar to certain Romance languages such as French. In such a construction, the verb in the adjunct is marked with the imperfective marker *-zhe*, while the rest of the predicate may be marked with a different aspect marker, e.g., the perfective *-le*. An example is provided below, with the adjunct phrase in brackets:

- (30) Xiaohui_i [bao-zhe xiaogou_j] lai dao-le ta ziji_{i/??j} de jia.
 Xiaohui hold-IMP small-dog come arrive-PFV 3rd self GEN home
 “Xiaohui has come to her own house while holding the doggie in her arms.”

Though judgment varies, to the extent that some speakers (the present author included) do find object co-indexation in (30) unacceptable, this indicates that the sentence does have an adjunction structure like the one shown in (29). Note, however, that this kind of adjunction structure is by no means unique to motion predicates. It can, in fact, appear in various types of constructions:

- (31) Ta ku-zhe xie gongke.
 3rd cry-IMP write homework
 “S/he did her/his homework in tears.”

Furthermore, the presence of an adjunct phrase does not preclude a motion predicate from having manner in its matrix clause:

- (32) Ta bao-zhe xiaogou zou dao-le haibian.
 3rd hold-IMP small-dog walk arrive-PFV ocean-side
 “S/he walked to the beach while holding the doggie in her/his arms”

Thus, the adjunction structure in (30) appears to be merely an option of the language, one that is not exclusively linked to motion predicates. Therefore, we maintain our hypothesis that motion predicates in Mandarin fundamentally have a complementation structure.

1.5.4 Other Evidence

Let us turn to two other pieces of evidence for the claim that Mandarin motion predicates have complementation structure. First, a coordination structure such as the one below allows multiple aspect markers:

- (33) wo yijing [shua-le ya] [xi-le lian].
 1st already brush-PFV tooth wash-PFV face
 “I already [brushed my teeth] and [washed my face].”

In contrast, an SVC structure denotes a single event and has only one inflectional spine (Aikhenvald, 2006). Therefore, multiple aspect markers are not allowed. The following sentences rule out the possibility that motion predicates are coordinated:

- (34) Xiaoniao yijing fei-(*le) dao-le shu shang.
 Small-bird already fly-(*PFV) arrive-PFV tree top
 “The birdie already flew to the top of the tree.”

- (35) Xiaogou lai-(*le) dao-le haibian.
 Small-dog come-(*PFV) arrive-PFV ocean-side
 “The doggie has come to the beach.”

Second, coordinated VP's in Mandarin typically can switch positions without interpretational change (Hsiao, 2009). Also, they generally allow an overt conjunction such as *han* between them:

- (36) Ni yao anshi [xiuxi] (han) [chi yao] / [chi yao] (han) [xiuxi].
2nd need on-time rest (and) eat medicine / eat medicine (and) rest
“You should [rest] and [take medicines] / [take medicines] and [rest] on time.”

As predicted, motion predicates do not have these properties because they do not have a coordination structure:

- (37) Xiaoniao fei (*han) dao shu shang.
Small-bird fly (*and) arrive tree top
Intended reading: “The bird flew to the tree top.”

- (38) Xiaogou pao guo qu / *guo qu pao.
Small-dog run cross go / *cross go run
Intended reading: “The doggie ran over.”

- (39) Baba shang qu (*han) dao san lou.
Father go-up go (*and) arrive third floor.
Intended reading: “Father went up to the third floor.”

Based on all the evidence presented above, I believe the hypothesis about the structure of Mandarin motion predicates is on the right track. In sum, a motion predicate has a complementation structure as in (6). It can be broken down into at least three components—manner, path, and Endpoint—with one taking the next as its complement.

1.6 Concluding Remarks and Organization of the Dissertation

This chapter presented the background of this study. As noted before, the syntactic structure of motion predicates in SVC languages has generally been understudied. Furthermore, most

existing studies that analyze the syntax of Mandarin motion predicates discuss the issue from a lexicalist perspective, while this dissertation presents a generative-constructionist point of view. I also hypothesized that motion predicates in Mandarin have a complementation structure with three major components, and the evidence supports this hypothesis.

This dissertation is organized as follows. Chapter 2 will provide the reader with a basic understanding of the Exo-Skeletal Model, the theoretical framework adopted here. I will also provide a brief, general description of the difference between the lexicalist and constructionist approach. Chapter 3 is on methodology. I will describe how the data used in this study were collected, transcribed, and coded. Backgrounds of the participants will also be provided. Chapter 4 is focused on the core of every motion predicate, namely, path. The data collected for this study will be examined in great detail here, and several syntactic patterns of path will be pointed out. Furthermore, unlike previous studies, I will provide a tentative explanation for the observed patterns. Chapter 5 deals with telicity in motion predicates. A formal definition of telicity will be provided, and I will argue that in Mandarin motion predicates, the presence of a functional projection called Asp_QP plays the decisive role in bringing about telicity. Chapter 6 summarizes this dissertation and points out remaining questions for future research.

CHAPTER 2. THEORETICAL FRAMEWORK & ITS BACKGROUND

2.1 Introduction

This chapter provides a basic introduction to the theoretical framework adopted for this dissertation and explains the main differences between generative-constructionist and lexicalist approaches to language.

2.2 The Exo-Skeletal Model (XSM)—An Alternative to the Lexicalist Approach

Proposed by Borer (2005a; 2005b; 2013), the Exo-Skeletal Model (XSM) is a generative-constructionist approach to syntax, semantics, morphology, and the interfaces between them. It is generative in the sense that its goal is to sketch out the structure of Universal Grammar, a research agenda pursued by most linguists in the tradition of Generative Grammar / the Minimalist Program. It is constructionist in nature because it attributes to syntactic configurations properties that are commonly assumed to be stored in the lexicon, such as the category of a word and the interpretation of an event. This view is in contrast with lexicalist approaches, which typically assume that lexical items (*cat*, *run*, etc.) come with inherent properties coded in their lexical entries, and that syntactic structure, at least in part, depends on these properties.

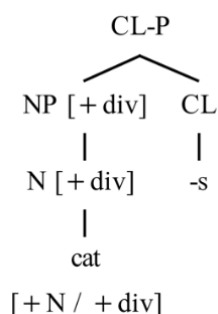
To illustrate the typical lexicalist view on the relationship between syntax and lexicon, consider a word like *cat*. According to this view, *cat* comes with the category Noun, and as such it must project into an NP. And since it is a count noun² (with, say, a [+div] feature), the NP it projects into can be selected by a classifier / plural head (i.e., the plural marker *-s*), which then projects into a Classifier Phrase (see illustration in (40)).

At this point, one can already see how information in a lexical entry may affect syntactic structure and its semantic interpretation: Most notably, a Classifier Phrase may not select an NP headed by a noun that is inherently mass. Thus, the form *advices* is unattested because *advice* does not have a count feature [+div] in its entry. The NP it projects into, therefore, cannot be selected by the classifier / plural head *-s*, resulting in the absence of a Classifier Phrase in the syntactic

² For an example of the view that nouns are inherently marked as count or mass at the lexical level, one can see Her & Chen (2013), where such a claim is explicitly made about English and Mandarin.

structure. (The incompatibility between a mass NP and CL-P may be formally described as a violation of some kind of feature-matching mechanism, though other executions may be possible³.)

(40)



Or take *run* for example. From a lexicalist perspective, *run* is lexically marked as an activity (thus inherently atelic) verb with only one argument, either an Agent or an Undergoer. As such, *run* is compatible with only one functional projection that introduces an argument (presumably some kind of *vP*). Any additional functional projection that may introduce a second argument will result in ungrammaticality, presumably because the verb does not have enough thematic roles in its entry to discharge. Again, we see how the growth of syntactic structure is, in a way, guided by information coded in the lexicon.

All of this is fine until we notice that *run* can sometimes take two arguments and even show up as a count noun:

(41) He ran the Boston Marathon in 2018.

(42) I went for a run.

The typical solution to this problem is to postulate multiple lexical entries for *run*, one for the intransitive verb, one for the transitive verb, one for the noun, etc. But this leads to another question: How many entries can be assumed to be listed without the theory failing to capture the creative power of language or losing its psychological plausibility? Nothing illustrates this point better than the following examples:

³ For instance, Watanabe (2006, p. 275) suggests that a noun is provided with a *[+/-number]* feature, whose value must match the value of another *[+/-number]* feature possessed by the # head above the noun. This ensures that if the noun has a count interpretation, it will eventually spell out with the plural suffix *-s*.

(43)

- a. The factory horns sired throughout the raid.
- b. The factory horns sired midday and everyone broke for lunch.
- c. The police car sired the Porsche to a stop.
- d. The police car sired up to the accident site.
- e. The police car sired the daylight out of me. (Clark and Clark, 1979)

Even if a native English speaker has never used or heard other speakers use the word *siren* as a verb before—thus having no entry of *siren* as a verb in the lexicon—, the above sentences are surely interpretable to them (and probably to most non-native speakers, too, as the present author can attest). Furthermore, the sentences have different numbers of arguments, ranging from only one in (a) (excluding the possible adjunct *throughout the raid*) to three in (c), all with different thematic roles. Finally, all the instances of *siren* have similar, yet slightly different interpretations. Of particular relevance to the present study is (d), which seems to denote the manner of a motion event (emitting a loud prolonged noise while moving), an interpretation that is absent in the other sentences. From a lexicalist perspective, the paradigm above is quite troublesome, as it seems psychologically implausible that the word *siren* has this many lexical entries, all listed in the speaker's mind.⁴

It is noteworthy that functional items, in contrast, typically don't exhibit the kind of flexibility seen in (43). Instead, they are extremely rigid, with fixed interpretations and distributions. Any violation of the rigid distribution pattern of a functional item will result in outright ungrammaticality rather than just infelicity, as pointed out by Borer (2005a). The following pair shows just this contrast:

(44) #There is too much cat in the soup.

(45) *I have three cat.

Although both sentences are unacceptable, they are so for different reasons. Sentence (44), with *cat* as a mass noun, has a reading that is at odds with our world knowledge (or dietary habits).

⁴ Similar arguments against a lexicalist approach are made by Goldberg (1995) in her proposal for Construction Grammar.

Sentence (45), though completely understandable and compatible with world knowledge, is outright ungrammatical because the numeral *three* (a functional item) appears without the classifier / plural marker *-s* (also a functional item).

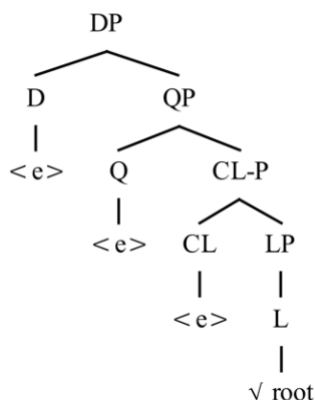
For reasons mentioned above, XSM shifts the focus of investigation from information in the lexicon to functional items and projections. Insofar as a lexical item has any discernible syntactic or semantic properties—such as countability, telicity, number of arguments, categorial membership, etc.—, those properties do not have to be stored in the entry. Instead, they can be derived from the functional structure within which the lexical item is embedded.⁵

2.3 The Basics of XSM: Functional Projections—The Core of Grammar

In this and the next two sections, I will review some of the basic principles of and assumptions behind XSM, focusing on those pertaining to this dissertation. The following is a selective summary of Borer (2005a, 2005b, 2013). While a detailed exposition of the model is not attempted here, interested readers may find more information in those three volumes.

In XSM, the core of grammar resides in the functional structures rather than in the lexicon. In the nominal domain, for instance, the syntax is essentially composed of these (or some of these) projections: Classifier Phrase (CL-P), Quantity Phrase (QP), and Determiner Phrase (DP).

(46)



⁵ While models like XSM shift the semantic burden from the lexicon to syntax, they do not deny the possibility that some semantic information *could* be stored in *both* lexical entries and syntax. It is entirely possible that the mind stores such information redundantly.

Several things are worthy of note. First, XSM assumes these functional projections are part of the UG and come with specific interpretations, and that the presence and absence of certain functional projections will result in certain interpretations (not necessarily ungrammaticality). For example, the projection of CL-P will return a count reading. (CL is realized as the plural suffix *-s* in English, according to Borer (2005a). Thus, *cats* is interpreted as countable because CL-P is projected.) Likewise, the absence of CL-P will result in a mass reading. Second, the hierarchical order of these functional projections is assumed to be universal; that is, the order is fixed across languages. For instance, if CL-P is projected, it is always below QP, whose function is to yield a quantity reading with a quantifier (e.g., *much*, *some*, etc.) or with a numeral (e.g., *five*). As Borer (2013) points out, however, the fixed hierarchical order of the functional projections, though universal, need not be construed as an innate specification of the language faculty. It is also quite plausible that the fixed order is simply a consequence of the innate properties of some other cognitive module, or properties of the interface between the language faculty and said module. Third, and perhaps most importantly, all functional projections come with a radically empty head (denoted by $\langle e \rangle$), which may be best conceptualized as an empty set (Borer 2013, p. 37). Let me elaborate in the next section.

2.4 The Basics of XSM: Range Assignment to Functional Heads

Since functional projections have empty heads, they must need something in order to properly return an interpretation. It may be helpful to use a mathematical function as an analogy:

$$[\lambda x : x \in \mathbb{N} \cdot \underline{\hspace{1cm}}] (x)$$

The underscored part of the formula is the range, which is a set that the function is supposed to map onto. Put differently, this set is supposed to comprise all possible outputs of this function. The set is currently empty because we have not properly defined what it should look like. Once we do so, calculation can take place. Below is an example:

$$[\lambda x : x \in \mathbb{N} \cdot \underline{2 * x + 3}] (x)$$

Now that range is properly defined, the function can map elements in the domain (i.e., possible values of x , which in this case are natural numbers, denoted by \mathbb{N}) onto elements in the range:

$$[\lambda x : x \in \mathbb{N} \cdot \underline{2 * x + 3}] (0) = 2 * 0 + 3 = 3$$

$$[\lambda x : x \in \mathbb{N} \cdot \underline{2 * x + 3}] (1) = 2 * 1 + 3 = 5$$

$$[\lambda x : x \in \mathbb{N} \cdot \underline{2 * x + 3}] (2) = 2 * 2 + 3 = 7$$

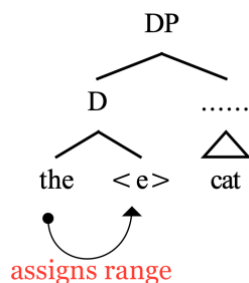
$$[\lambda x : x \in \mathbb{N} \cdot \underline{2 * x + 3}] (3) = 2 * 3 + 3 = 9$$

.....

The same idea applies to functional projections. With empty heads, functional projections need certain linguistic elements, such as morphemes, abstract features, adverbial phrases, etc., to provide their heads with semantic content, or, using Borer's (2005a) terminology, to assign range to the heads. Once a head is assigned range, the projection can properly return a semantic interpretation. On the other hand, if no range is properly assigned, computation will crash⁶.

Borer (2005a) has proposed several ways to assign range to a head. I will briefly introduce two that are most relevant to our topic. First, range may be assigned by a functional morpheme or an abstract feature (such as <def>, <div>, <past>, etc.) occupying the head position:

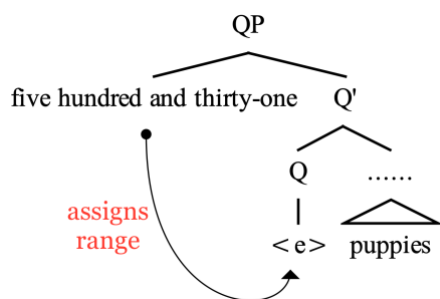
(47)



Alternatively, it may be assigned through specifier-head agreement by a functional morpheme or a phrase (i.e., a maximal projection) occupying the specifier position:

⁶ One might wonder how a functional projection gets its categorial label (e.g., DP, QP, TP, etc.) if its head is empty. Borer's (2013) answer is that the label is "inherited from the range assigner" (p. 37). For example, an empty head <e> is labeled as [D<e>] because only a particular set of elements that we call Determiners (*the, this, that, a, <def>, my, etc.*) may assign range to that <e>. The maximal projection of that <e> (now [D<e>]) naturally becomes DP.

(48)

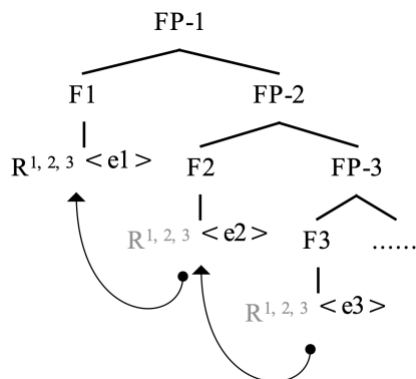


In principle, one empty head cannot be assigned range by more than one element. (Consider how little sense it makes to define the range of a mathematical function more than once.) The phrase below is ruled out because <e> is assigned range by both *the* and *my*, resulting in what I will call “double marking” (i.e., a head being assigned range more than once):

(49) *[_{DP} theⁱ [_{D'} myⁱ <eⁱ> [_{LP=NP} dog]]] (“*the my dog”)

It is, however, possible for one element to assign range to multiple empty heads. One way this can happen is through movement. To illustrate, suppose a range assigner R is able to assign range to the heads of three different functional projections, FP-1, FP2, and FP-3 (see (50)). We can have R occupy the lowest head <e3> first and then subsequently move up to the other heads through head movement. This way, all three heads are assigned range by R. Head movement motivated by the need for range assignment will be important for Chapter 5, where telicity will be discussed.

(50)



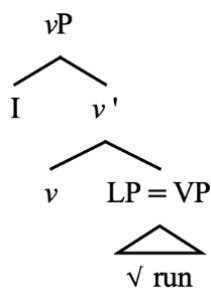
2.5 The Basics of XSM: What is a Root?

Recall that in earlier sections, I mentioned that lexicalist theorists tend to attribute the syntactic behavior of a lexical item to its entry. Thus, a word like *run* can be used as a verb to denote an activity because it is specified as, for example, [+V] and [+process, -result] in the lexical entry. Also recall that I questioned whether this view can adequately capture the potential flexibility of lexical items (think about the *siren* example in (43)) without inflating the lexicon to a psychologically implausible degree. Now, let us consider a generative-constructionist view.

In XSM, a lexical item is treated as a root—a packet of phonological information (Borer, 2013). An item like *run* has some phonological information in its entry, presumably something like /ɪʌn/, but there are no specifications about its category, argument structure, or the type of event it denotes⁷. The various behaviors we see in *run* are entirely attributable to its functional environments. Consider the following examples.

(51) I run every morning.

(52)



Here, *run* behaves like a verb because it is embedded inside a vP. In other words, it is categorized as a verb by virtue of merging with the functional head *v*. If *run* is embedded inside a DP, it will be categorized as a noun instead:

(53) I went out for [DP a [LP=NP run]]. (CL-P and QP are omitted for simplicity.)

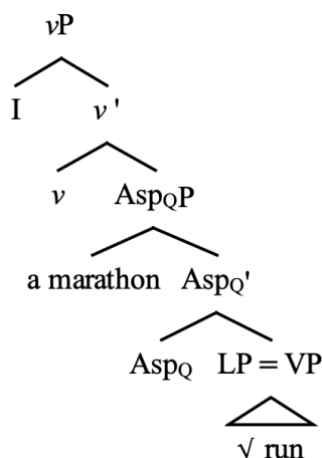
Also, notice that in (51) *run* only has one argument. This is not because of some specification in the lexical entry, but simply because the structure in which it is embedded happens to have only

⁷ Whether a root contains any conceptual content at all is still under debate. I leave this issue aside, as it does not affect my analysis in any significant way.

one functional projection that can introduce an argument (i.e., *vP*). Should there be another argument-introducing projection, *run* can easily take two arguments:

(54) I ran a marathon (in 3 hours and 21 minutes).

(55)



It is worth pointing out that (54) has a telic interpretation (as evidenced by its compatibility with the *in X time* phrase) while (51) does not. Clearly, there is no easy way to attribute the difference in telicity to some lexical specification of *run*. And even if one chooses to postulate two separate entries of *run* with two separate specifications regarding telicity (perhaps one with [+activity] and the other with [+accomplishment]), they will also have to do the same with a huge number of other verbs—at the very least, all verbs that can denote manner of motion. (For example, “I walk/swim/fly every morning” vs. “I walked/swam/flew three miles in 20 minutes.”) Such a move, therefore, will certainly miss an important generalizable pattern. Removing this kind of repeated information from the lexicon, XSM attributes the telic reading in (54) to the presence of AspQP (more on this in Chapter 5), and the atelic reading in (51) to its absence, thereby shifting the burden of interpretation to syntax.

Let us turn to Mandarin for another set of examples. Consider the lexical item *gui*, which is most commonly used as a noun to mean *turtle*:

- (56) You yi zhi **gui**. [QP yi [CL-P zhi [LP=NP gui]]]
 Have one CL turtle
 “There is a turtle.”

Interestingly, a quick Google search returns many instances of *gui* being used as a verb or adjective. These uses are a relatively recent trend that has been developing particularly among younger generations of Taiwan Mandarin speakers:

- (57) Ta **gui**-le san fenzhong. [AspP gui-le [vP gui [LP=VP gui]]]
 3rd turtle-PFV three minute
 “S/he moved at a low speed for three minutes.”
 (Found on www.ptt.cc, referring to someone driving at an abnormally low speed.)

- (58) Tingshuo ta hen **gui** de. [DEG-P hen [LP=AP gui]]
 Hear 3rd very turtle de
 “I heard that it is very slow.”
 (Found on chinese.cdinet.info, referring to a plant’s growth rate.)

To the extent that all verbal instances of *gui* appear inside a certain set of functional projections (vP, AspP, AspQP, etc., but not CL-P, QP, or DegP), and that all adjectival instances appear in another set (DegP, etc.), we question whether it is really necessary to postulate categorial information in the lexicon. A more elegant approach, it seems, is to treat lexical items as category-less roots with no specifications of argument structure, thematic roles, or event type.

In short, XSM places the burden of semantic interpretation on syntactic structures and functional items. Interpretations such as telicity, quantity, countability, agentivity, and so on arise from syntactic structural configurations, not from lexical entries.

2.6 A Few Notes on the Application of XSM to Motion Predicates

In section 1.5 I proposed a syntactic structure of motion predicates (see (6)). I also mentioned that the structure is slightly different from previous accounts in that the projections below Manner-

V, including path and End-P, all have radically empty heads. In doing so, I implicitly assumed those projections are functional. Let me justify this decision.

First, there are only a limited number of elements that can appear in path and End-P to provide semantic content, and this is quite similar to the fact that only a limited number of elements can appear in, say, AspP to provide aspect information. In this sense, the elements form a closed class and generally do not welcome new members, which is a hallmark of functional categories. To illustrate, take Ver-P in (6) for example, which is a projection whose head can be realized either as *shang* (“go-up”) or *xia* (“go-down”) (Chen 2017, Zheng 2015). Mandarin has other “vertical verbs” that are synonymous with *shang* and *xia*, namely, *sheng* (“go-up; ascend”) and *jiang* (“go-down; descend”). However, these verbs cannot appear in [Ver<e>] position, as (59) and (60) show. Another synonymous pair is *yue* and *guo*, both of which can be translated as “cross.” However, not both of them can appear in [Hor<e>], as (61) reveals:

- (59) Xiaoniao fei *sheng / shang lai.
 Small-bird fly go-up come
 “The birdie flew up.”

- (60) Xiaoniao fei *jiang / xia qu.
 Small-bird fly go-down go
 “The birdie flew down.”

- (61) Ta fei *guo / yue lai
 3rd fly cross (over) come
 “He flew over here.”

This restriction appears especially curious if one considers certain lexicalist accounts, such as the one developed in Lin (2015a, 2015b, 2019). In her account, the four “vertical verbs”—*sheng*, *jiang*, *shang*, and *xia*—belong to the same group of “open-scale, free motion morphemes” (Lin 2015b, p. 329). If these four morphemes all denote vertical motion with the same scalar property, and if Ver-P is a lexical phrase, it is rather puzzling why only *shang* (“go-up”) and *xia* (“go-down”), but not *sheng* (“go-up”) and *jiang* (“go-down”), can function as the head of Ver-P. The same can

be said about *guo* and *yue* (“cross”), which Lin (2019) put in the same category of closed-scale verbs with either a multi-point or a two-point reading (p. 122). However, only *guo* is allowed to appear in the (61), suggesting an exclusiveness of path that is hard to explain in terms of lexical semantics alone.

The exclusiveness of path is in sharp contrast with manner. In most accounts (e.g., Osei-Tutu, 2019, Taherkhani 2019, Chen 2017, Zheng 2015, among others), including the present one, Manner-VP is analyzed as a lexical projection, and as one would expect, there is in principle an unlimited number of verbs that may appear in Manner-V position, e.g., *fly*, *swim*, *walk*, *roll*, *climb*, *skate*, *rush*, etc. Furthermore, note that verbs that may appear in Manner-V position need not have any motion-related meaning at all. The verb *siren* in (43), reproduced below, is a case in point:

(62) The police car sired up to the accident site.

As already mentioned, one would be hard pressed to argue that the lexical entry of *siren* has any inherent meaning associated with motion. Insofar as (62) does have an interpretation of displacement, there is good reason to think it stems solely from the functional particles *up* and *to*. In Mandarin, one can also find this kind of coercion effect, where a lexical item is forced by the surrounding functional structure to yield an interpretation that is less commonly associated with the lexical item but is most compatible with what the functional structure and its range assigners rigidly denote. An example is below:

(63) Cong Shengli Hao yi lu [MANNER chi [PATH guo qu]].
 From Victory Shop one way eat cross go.
 “Eat our way up the street, starting from Victory (a restaurant’s name).”
 (Found on <https://echo978.pixnet.net/blog/post/62706758>)

Clearly, no one would suggest that the verb *chi* (“eat”) denotes a type of motion or manner of motion as its core meaning⁸. Yet, there is no restriction whatsoever that excludes *chi* from the Manner-V position. In this case, one would have to interpret *chi* as an action that is performed

⁸ Keep in mind that the term *motion* in the present line of studies refers to translational motion in the sense of Talmy (2000).

while in motion (contrary to the more salient conception of an eating event, in which the eater is seated), or as a set of sub-events that take place in sequence at multiple points along the path and thereby lead to the displacement of the Figure (i.e., multiple sub-events of eating, each of which takes place at a different restaurant along the street). Again, this shows a striking contrast between manner and path. The former is lexical in nature and welcomes all sorts of verbs, even those whose commonly associated meanings are not related to change of location or manner of motion. The latter appears to be functional and quite selective, excluding certain verbs whose semantics match perfectly with the notion of motion.

It is necessary to emphasize that what is being argued here is that End-P and the projections inside path are functional in nature. That's not to say range assigners for the heads of those projections cannot share some syntactic or morphological properties with lexical verbs, or that those range assigners cannot be used as lexical verbs at all. To be sure, in languages such as English, clear morpho-syntactic distinctions exist between lexical verbs (e.g., *ascend*, *descend*, *arrive*) and range assigners for path and End-P (e.g., *up*, *down*, *to*), and using a range assigner as a lexical verb would result in outright ungrammaticality (e.g., **I have to-ed the store*). However, I assume there exist languages in which lexical verbs that denote motion are undergoing processes of grammaticalization, and that those lexical verbs are “co-opted” by the grammar to work as range assigners while maintaining their lexical usage. In fact, this assumption is consistent with the observation that a certain closed set of motion verbs in Mandarin have multiple identities and functions. (This closed set of verbs are sometimes called directionals or directional particles in the literature. They include *shang* (“go-up”), *xia* (“go-down”), *guo* (“cross”), *lai* (“come”), *qu* (“go”), *dao* (“arrive”), and some more (Butt, 2010).) Some studies (e.g., Chor 2018, Butt 2010) have shown these motion verbs have different semantic or phonological properties depending on what syntactic environment they are in⁹. It is thus plausible that these verbs have a double life, functioning as range assigners and lexical verbs in different environments, even exhibiting distinct semantic and phonological properties in certain dialects of Mandarin.

⁹ For instance, Butt (2010) reports that *guo* (“cross”) must receive tone when functioning as a main verb but does not need to when functioning as a directional. (What Butt means by *directional* in her context is essentially a range assigner for PATH in our framework.) Also, *guo* as a directional may take either a locative or a theme argument, but as a main verb it does not have the same selectional restrictions. Although I am not a speaker of the dialect Butt is referencing and therefore do not share the judgments, the point here is that these motion verbs appear to have gone through some grammaticalization process by which they have acquired different identities and functions. Thus, they exhibit different characteristics in different syntactic positions.

How does the observation above fit into XSM? Two things are worth mentioning here. First, End-P and the projections inside path may very well be functional in nature and have rigid interpretations that cannot be easily coerced.¹⁰ Thus, it is not an unjustifiable move to assign empty heads to those projections and treat the motion “verbs” that constitute path and End-P as range assigners. Second, recall that “lexical verbs” in XSM are actually inherently category-less roots embedded in an event structure (i.e., extended projections in the verbal domain, such as AspQP, *v*P, TP, etc.). This means that in Mandarin—and other languages that employ SVC’s for motion predicates—those range assigners *can* be categorized as verbs if embedded in an event structure, and that they contain in their entries relevant morpho-phonological information that allows them to take on various inflections associated with verbs. I believe this treatment of the so-called “motion verbs” is the best way to combine my own proposal with the valuable insights from previous works done by Benedicto and Salomón (2014), Osei-Tutu (2019), Taherkhani (2019), and Zheng (2015).

Finally, a note on terminology is in order. From now on, I will refer to range assigners to the empty heads in path as **motion morphemes**. The term *morpheme*—rather than the term *verb*—is chosen so that the reader will be reminded of their semi-grammaticalized nature. Furthermore, several studies have used the term *motion verb* to refer to fully lexical verbs that can only appear

¹⁰ Consider a simple sentence like (i):

- i) Wo zai meimei *(dao/qu) xuexiao.
 1st drive sister *(arrive/go) school
 “I drive my sister *(to) the school.”

Suppose we take away the morphemes in parentheses. Based on world knowledge and context, most people can still intuitively interpret (i) as a motion event, with the sister as the Figure and the school as the Goal. But even though it may seem effortless to interpret (i) without *dao* or *qu*, it is completely ungrammatical to drop them. Again, as we noted with earlier examples, the issue here has nothing to do with intelligibility but everything to do with the core grammar, in which End-P and PATH appear to play crucial roles. We may also consider a bizarre sentence below:

- ii) #Xuexiao dao-le meimei.
 School arrive-PFV sister
 #“The school has arrived at the sister.”

A mirror image of sentence (i), sentence (ii) violates our world knowledge but maintains a syntactically sound structure. I suppose for most people it takes quite some mental effort to interpret (ii), most likely by imagining a school that is somehow portable moving to a place called Meimei. It seems unlikely to me (and to two other speakers who I consulted) that, instead of re-interpreting *xuexiao* and *meimei*, a speaker would choose to re-interpret *dao* as “to be arrived at,” even though logically speaking, coercing one word should be easier than coercing two. If we assume *dao* is (semi)-functional, then this comes as no surprise because functional elements are typically rigid with fixed interpretations while lexical items are more likely to be coerced.

in manner and yet are strongly associated with concepts of translational motion (recall the verbs *sheng* (“go-up”) and *jiang* (“go-down”), which can appear in manner but not in path). It may be wise to keep referring to those fully lexical verbs as *motion verbs*, given that they exclusively appear in what we label as Manner-V in the hypothesized structure. This way, an important structural distinction can be retained.

2.7 Conclusions

In this chapter, we discussed some of the key differences between lexicalist and generative-constructionist approaches to syntax. While the former tends to attribute certain syntactic and semantic phenomena to the lexicon, such as telicity, countability, number of arguments, etc., the latter tends to attribute them to a set of functional elements. In XSM, these elements consist of empty-headed functional projections and a repertoire of range assigners. We further discussed how range may be assigned to an open value. Oftentimes, it involves head movement, specifier-head agreement, or inserting a range assigner directly in the position of the empty head. The chapter also covered the notion of roots, which are lexical items that acquire categorial labels from their immediate functional environment. Finally, we argued that path and End-P are (semi)-functional in nature, and as such they require range assignment.

CHAPTER 3.METHODOLOGY

3.1 Introduction

This chapter describes how the data for this study were gathered. Section 3.2 provides some basic information on the data collection instrument and what parameters the instrument is designed to elicit. Information on the participants and the data-collection procedure are covered in section 3.3. Finally, section 3.4 describes how the data were processed, and section 3.5 discusses supplementary sources of data.

3.2 Data Collection Instrument

The instrument used for data elicitation is a computer software that contains a set of animated short videos designed by Elena Benedicto (2017) in collaboration with the Envision Center at Purdue University. The set consists of 175 videos in total, organized around 19 different themes, including a bird, a goose, a ball, a paper airplane, etc. The software randomly organizes the videos into seven blocks and allows the participants to play through the clips one-by-one at their own pace. The user interface of the software is simple and requires little technical expertise to use. Once the software is opened, the participant will see the following window (Figure 3.1), in which they can choose a block to start with:

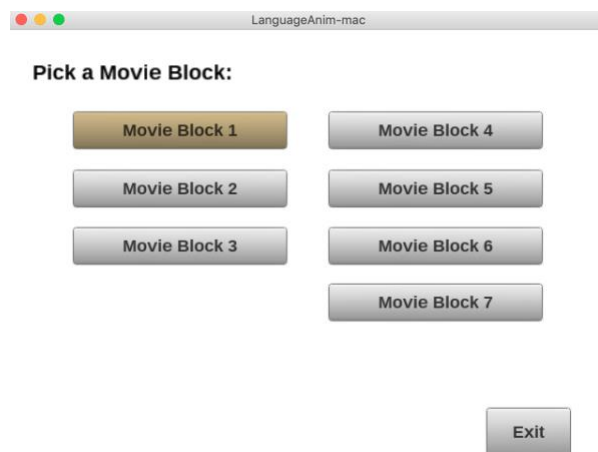


Figure 3.1: User interface of the software

Once the participant has chosen a block, the software will play the video clips in that block in a randomized order. The videos are played in a window like the following:



Figure 3.2: Example of an animated video clip

At the bottom of each video are three buttons that allow the participant to navigate through the block. The left-pointing arrow takes the participant to the previous clip, the right-pointing arrow the next. Clicking the middle button with a circle will replay the video. To exit the current block, the participant will click the button at the top left corner, and it will bring them back to the window shown in Figure 3.1. Each video has a unique ID number shown at the bottom right corner. By using this ID number to name audio recordings and ELAN files, we can easily see which piece of elicited data corresponds to which video prompt.

The videos are designed to elicit contrasts between several parameters of motion predicates. They are designed in such a way that we can minimally compare pairs or trios of motion events with respect to a certain parameter while keeping other parameters constant. This allows us to identify linguistic elements relevant to the contrasts of interest. The following sub-sections discuss these contrasts and provide examples of relevant video clips.

3.2.1 Trajectory / Path

A contrast between “going up” and “coming down” is shown below (Figure 3.3 and Figure 3.4).



Figure 3.3: A bird going up



Figure 3.4: A bird coming down

In Figure 3.3, the girl releases the bird and lets it fly away and upward, and it ends up on a fence that is higher than the starting point. In Figure 3.4, the girl releases the bird just as in Figure 3.3, but the bird flies downward toward the viewer and ends up on a fence that is lower than the starting point. These examples form a minimal pair in that all the elements in the two events are the same (the girl, the river, the bird, the presence of a starting point and an endpoint, etc.) except for the path. Put differently, both motion events involve the girl releasing the bird, the bird flying over the river, and the bird landing on top of a fence. However, in Figure 3.3, the path of motion is upward (indicated by the presence of a rock, which makes the fence higher than the bird's starting point) and at the same time away from the viewer. In Figure 3.4, the path is downward (since the fence is now on the ground while the girl is on top of the rock) and towards the viewer. By using minimal pairs like these two videos, we can elicit data on the three dimensions of the complex path, namely, the vertical, horizontal, and deictic dimensions (Benedicto & Salomón, 2014).

3.2.2 Telicity

With respect to the parameter of telicity, the videos are designed to capture a three-way contrast, illustrated by the following trio:

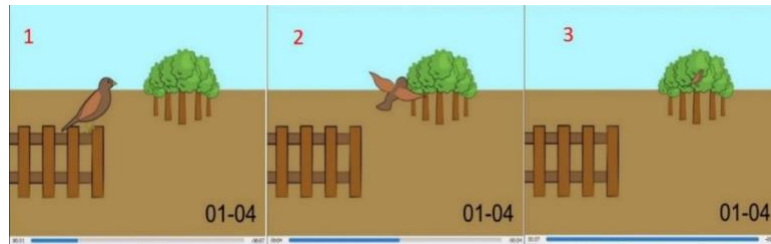


Figure 3.5: A bird reaching the tree top (telic)

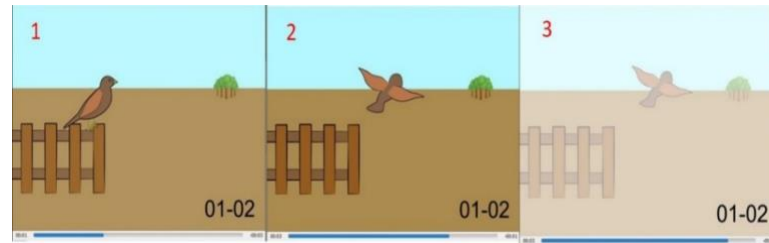


Figure 3.6: A bird flying toward the tree top without reaching it (atelic, underspecified)

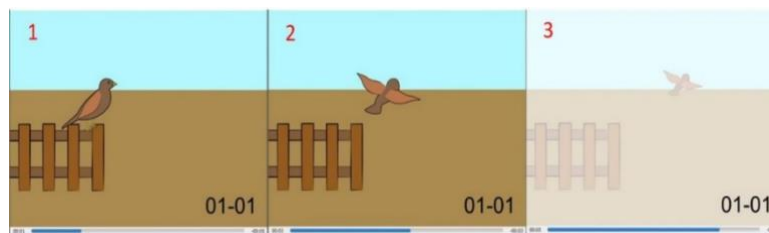


Figure 3.7: A bird flying away (atelic, unspecified)

In these examples, the distinction between telic and atelic is made by showing whether the figure in a video reaches a goal. In Figure 3.5, the participant can see the bird land on the tree top, and therefore the event is telic. In Figure 3.6 and Figure 3.7, however, the participant does not see the bird reaching a goal, and both videos end with the bird still flying in midair. Thus, both events are atelic. In Figure 3.6, the participant can see a potential goal for the bird, namely, the tree that the bird appears to be flying toward, but the video is cut before the participant can tell whether the goal is actually reached or not. We refer to this type of atelic motion event as underspecified. In contrast, Figure 3.7 does not have anything that can be perceived as a potential goal by the participant. This type of atelic motion event is referred to as unspecified. A trio like this helps us identify the linguistic element(s) responsible for telicity and the way syntax incorporates a potential goal in an atelic structure.

3.2.3 Agentivity

To elicit the contrast between agentive and non-agentive motion events, videos like the following minimal pair are used:

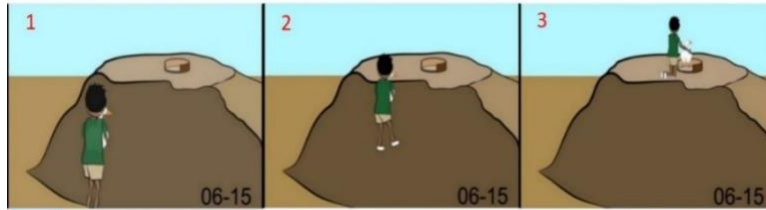


Figure 3.8: A boy carrying a goose (agentive)

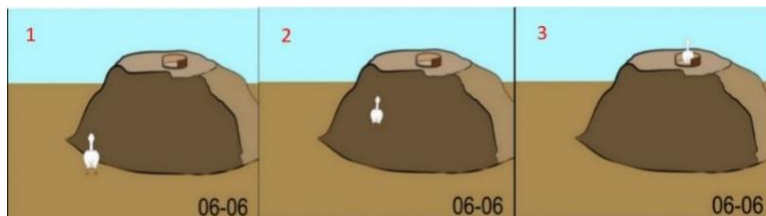


Figure 3.9: A goose moving on its own (non-agentive)

In both events, the goose undergoes an upward motion, moving away from the viewer and ending up inside what appears to be a coop. The only difference is whether there is an external causer of the motion (i.e., an agent). In Figure 3.8, there is a boy causing the motion by carrying the goose all the way up and placing it in the coop, hence an agentive event. In contrast, Figure 3.9 shows the goose moving up and going into the coop by itself without any external causer; thus, it is a non-agentive event.

Agentive motion events can be further divided into two types: initial contact vs. continuous contact. The contrast between them can be elicited with a minimal pair like the one below:



Figure 3.10: Agentive, initial contact

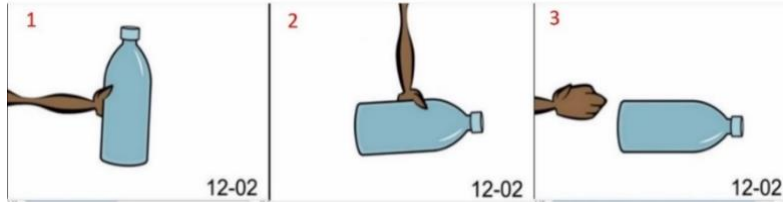


Figure 3.11: Agentive, continuous contact

These two events are a minimal pair because they both involve the same object (i.e., a bottle) falling down in the same direction due to the same external agent (i.e., the person whose hand is shown). The only difference is how the agent causes the motion. In an initial-contact event, exemplified by Figure 3.10, the agent causes the figure to undergo motion by making contact with it, but after that initial period of contact, the causer does not participate in the motion of the figure anymore. In this case, the hand causes the motion by pushing the bottle but ceases to move while the bottle is still in the process of falling down. In contrast, a continuous-contact event such as the one in Figure 3.11 involves the agent in constant contact with the figure throughout the motion. Here, the hand initiates the motion and does not leave the bottle until it finally assumes the resting position on the ground. Minimal pairs like this help us identify the grammatical device(s) a language employs to encode this contrast.

3.2.4 Boundary Crossing

Another contrast that the videos are designed to elicit has to do with whether the figure crosses a discernible boundary on its path. The following pair shows this contrast:



Figure 3.12: A figure crossing a boundary



Figure 3.13: No boundary on the path

In Figure 3.12, the bird flies over a river on its way to the fence. Here, the river is perceived as some sort of boundary on the path, and the bird crosses it on its way to the final goal, i.e., the fence. In Figure 3.13, there is no discernible boundary on the bird's path, only empty space between the starting point and the goal. These two videos form a minimal pair in that all the elements in them are the same (e.g., the trajectory of motion, the agent, telicity, etc.) except for the parameter of boundary crossing.

3.3 Participants and Data Collection

This section provides some basic information on the participants of this study and the process by which data were gathered and coded.

3.3.1 Participants

The data were gathered from three native speakers of Taiwan Mandarin. All of them are female, born and raised in different parts of Taiwan. At the time of elicitation, their ages were around 30, 51, and 64. All three speakers know English as a second language; one of them uses it regularly for professional purposes, while the other two only use it occasionally for various purposes. All three have received some education in the US at different levels for different lengths of time. One went to a middle school in the US for about 11 months at the age of 10; the other two both went to graduate school in the States in their mid-20s and early-30s. One speaker also knows Hakka and spoke it as her first language in childhood. However, when asked about her current proficiency, she said she does not have a good command of the language anymore¹¹.

¹¹ In an unsuccessful attempt to collect Hakka data from this speaker, I noticed that she had little trouble with sentence structure, functional elements (such as numerals, classifiers, motion morphemes, etc.), and commonly used lexical items (such as words for *tree*, *fly*, and *girl*). What frustrated her the most during elicitation appeared to be her lack of vocabulary for certain objects and actions, such as the slide, the hoop, etc.

3.3.2 Data Collection Process

It is worth noting that the elicitation process of this study is not meant to mimic procedures that are common in typical control experiments. For instance, while a typical control experiment generally does not allow multiple responses to a single stimulus, the participants in this study were allowed to provide multiple utterances for a video clip if they wanted to. In fact, during the process it was often necessary for the participants to clarify what they saw in a video, how they construed the motion event, and why they produced their utterance(s) in response to that event, all of which are not usually allowed during the process of a control experiment. For example, when seeing an underspecified atelic clip, the participants often automatically assumed the figure would eventually reach the potential goal and produced a telic utterance as a result. When that happened, the researcher would ask follow-up questions such as “Did the bird reach the tree?” or show them the other video in that minimal pair (i.e., the one that is actually telic) to help them notice the contrast. Sometimes a discrepancy between an expected response and an actual response was noticed after the elicitation had finished. In that case, the researcher would conduct a follow-up interview by contacting the participant either in person or through video on Skype with the relevant video clip(s). All elicited responses, whether during elicitation sessions or follow-up interviews, were audio-recorded.

3.3.3 Data Collected

A total of 529 utterances were collected from the three participants. This number exceeds the total of expected utterances, which is 525 (175 animations x 3 participants). The reason is that, as mentioned earlier, some participants provided more than one utterance in response to one prompt. For the purposes of this dissertation, which is focused on path and telicity, we summarize the data in (64).

For the vectorization of path, which will be discussed in detail in Chapter 4, we organize the prompts according to the number of dimensions they depict. An utterance is considered “target” if it uses a morpheme or morphemes that correspond to the dimension(s) depicted in the prompt. For example, an utterance elicited by a “horizontal-only” prompt is considered “target” if it has the motion morpheme *guo* (“cross”) and no other motion morphemes in its path component. Otherwise, the utterance is considered “non-target.” As already can be seen in (64), the total

number of target responses is quite low. The reason is not that the participants did not understand the purpose of the elicitation sessions. Rather, as will be clear in Chapter 4, it is because the participants employed a number of alternative constructions to describe motion. They used these alternative constructions because they perceived certain aspects of a motion event as more salient than others and, more importantly, because path in Mandarin has certain syntactic constraints that prohibit the participants to produce target responses.

For telicity, we break down the prompts based on whether a Figure reaches a goal. An utterance elicited by a telic prompt is counted as “target” if it can be unambiguously interpreted as an event where the Figure ends up at a goal. Such an utterance typically has the verb *dao* (“arrive”) or *jin* (“enter”) in it. If an utterance cannot be unambiguously interpreted as such, it is considered “non-target.” For atelic prompts, since Mandarin does not have a designated marker for atelicity, the number of target responses is counted as follows: If an utterance elicited by an atelic prompt is unambiguously interpreted as an event where the Figure ends up at a goal, then it is counted as “non-target.” The total number of responses minus that of non-target responses is the number of target responses for atelic prompts.

As mentioned earlier, follow-up interviews were conducted when clarification was needed for non-target responses.

(64) Breakdown of Elicited Data

Parameters		No. of items/stimuli	No. of Expected Responses	No. of Target Responses
a. Process	Vectorization			
	1 spatial plane	Horizontal: 19 items	57	6
		Vertical: 24 items (including prompt 6-9)	72	10
	2 spatial planes	Deictic + Horizontal: 44 items	132	27
		Vertical + Horizontal: 8 items (including prompt 7-3)	24	0
	3 spatial planes	Vertical + Horizontal + Deictic: 57 items	171	0

b. Telicity	Telic (including dispositional change events)	78 items	234	199
	Atelic items (including dispositional change events)	75 items	225	208

3.4 Data Processing

This section describes the data processing procedure.

3.4.1 Naming Conventions

Two naming conventions are used in this study. One is used in the text of this dissertation to indicate the sources of example sentences. Each name follows a pattern like this: [#####MANXX(-#)]. Starting from the left, there are four digits that represent the unique ID number of a video prompt. For instance, if an example sentence was in response to a video with the ID number 12-03, the sentence will be named [1203MANXX]. The three letters following the ID number represent the name of the language. Since the data used in this study are in Mandarin, all elicited sentences will have MAN in their names. The two letters after MAN are pseudo initials of the participant who produced the data. For example, if a sentence was produced by a participant whose pseudo initials are SD and the sentence was elicited with video 12-03, it will be named [1203MANSD]. If this sentence is not the only utterance made by SD in response to 12-03 (recall that the participants were allowed to produce multiple utterances for one prompt), there will be an additional digit suffixed to the name (e.g., [1203MANSD-1]), indicating which utterance is being cited here in the text. The second convention is used for the naming of ELAN files. Each file name starts with the ID number of the corresponding video prompt, followed by the name of the language (i.e., MAN), which in turn is followed by the initial of the participant's last name (e.g., 1203_MAN_C). If a participant made more than one utterance in response to the same video, they were saved as separate ELAN files, and a number was suffixed to the end of each file (e.g., 1203_MAN_C_1).

3.4.2 ELAN Files

The language annotation software ELAN was used in this study to process elicited data. A number of important tiers are worth mentioning here. First, the **Utterance** tier is used to record an utterance elicited by a video clip. One utterance may contain more than one sentence, and if that is the case, all sentences will appear on the Utterance tier. For example, upon seeing a video, a participant sometimes used one or two sentences to describe the context (e.g., where the agent was located, where the figure was located in relation to the agent, where the goal was, etc.). She would then use another sentence to describe the motion event taking place in that context. In such a case, even though we were primarily interested in motion predicates, all the sentences would be recorded on the Utterance tier.

Second, the **Clause** tier tokenizes Utterance into individual sentences or predicates (if there is more than one). To determine whether an utterance has one or more sentences / predicates, we ask whether the utterance denotes one or more events, which can in turn be determined by using some of the SVC tests already mentioned in Chapter 1 (e.g., whether there is only one inflectional spine, whether an overt conjunction can appear, etc. Also, recall that SVC's denote single events). For instance, an utterance like "The bird flew away and arrived on the fence" would be tokenized into two predicates on the Clause tier. This is because the utterance denotes two events instead of just one, evidenced by the presence of an overt conjunction between the two verbs. Furthermore, one can easily change the tense value of one predicate without affecting that of the other (e.g., "The bird has flown away and will arrive on the fence."), suggesting there are two separate inflectional spines, hence two separate predicates on the Clause tier.

Below the Clause tier are a number of dependent tiers for different parameters. The **Telicity** tier shows whether the elicited motion predicate is telic or atelic; the **Completive** and **Stative** tiers are for videos that show completive and stative events, which will not be discussed in this work; the **Agent** tier shows whether the motion event involves an external causer. Note that even though some languages may use an unergative structure (i.e., a structure whose sole argument is interpreted as an agent) for a motion event that the figure undergoes by its own volition without an external causer (e.g., see Figure 3.5), such an event is still marked as non-agentive on the **Agent** tier. Agent also has a child tier, **Continuous**, which indicates whether an agentive event is initial or continuous contact.

There are a few more tiers worth mentioning. The **Word Level** tier tokenizes the sentence(s) / predicate(s) on the Clause tier into individual words. The **Morpheme Level** tier, in turn, tokenizes words into individual morphemes. However, since Mandarin is analytic in nature, the Morpheme tier and the Word tier are often the same. The **Category** tier marks the category of each morpheme. The **Word Level Translation** tier records the gloss of every morpheme, including both lexical and functional morphemes. For instance, the aspectual marker *le* is glossed as PFV (perfective) on this tier. Finally, the **Sentence Level Translation** tier records the English translation of the whole utterance.

In addition, there are a number of tiers for meta-data, such as the interviewer's name and the date of the interview. The audio recording of the utterance and its corresponding video prompt are both linked to the ELAN file, so that the audio, video, and transcription can be accessed all at once. Figure 3.14 is an example of an ELAN file:

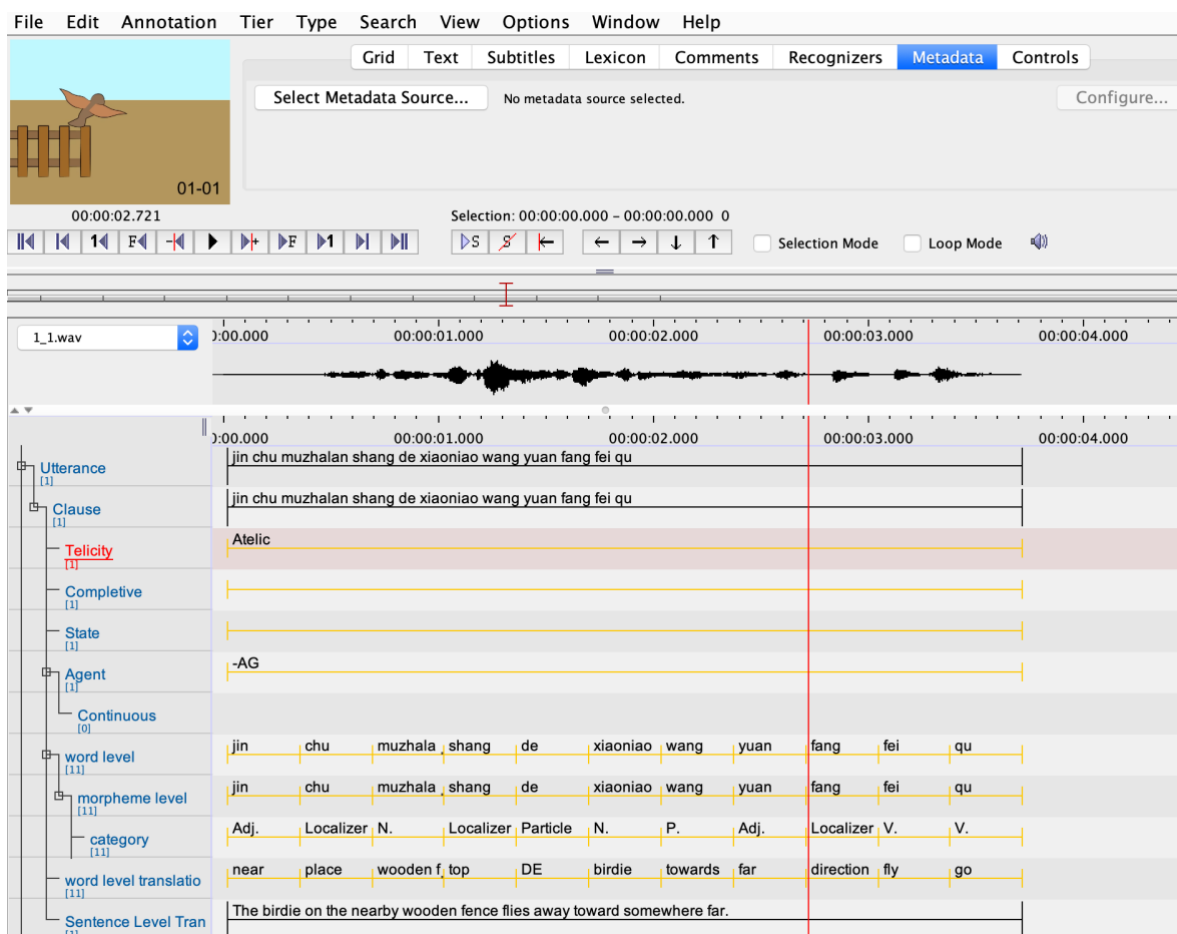


Figure 3.14: Example of an ELAN file

3.5 Other Sources of Data

While the instrument is an extremely useful tool for data elicitation, the current version has a few shortcomings. For example, there is no video that shows a figure starting right in front of the viewer and moving closer to him or her, i.e., a figure moving closer on a horizontal plane along the viewer's line of sight instead of crossing it. For cases like this, the researcher would use objects (such as a plush toy, a bottle, or an action figure) as figures and create motion events in a real space. The participant would then tell the researcher how she would describe the events in Mandarin.

In addition to producing utterances in response to the video clips, the participants also provided yes-no grammaticality judgments for various sentences. The researcher, for instance, would show the participants a video clip and ask whether a particular Mandarin sentence was grammatical or felicitous for that context. The participants also provided yes-no judgments for non-motion predicate example sentences used in this dissertation¹², including those used in Chapter 1.

3.6 Conclusions

This chapter discusses the elicitation instrument for this study, specifically what contrasts and parameters it is designed to elicit. Backgrounds of the participants and the data collection process have also been covered.

¹² All example sentences used in this dissertation, including the ones in footnotes, were judged by at least one native speaker other than me.

CHAPTER 4. PATH

4.1 Introduction

This chapter is focused on the core component of the motion predicate, namely, PATH. What is a path? How can it be characterized? In section 4.2, I will begin with a discussion on how a path may be conceptualized in a Cartesian coordinate system and point out some important implications of this conceptualization. Specifically, a path can be broken down into three coordinates, which represent motion in relation to the horizontal, vertical, and deictic dimensions respectively. These coordinates map onto three projections in my structure: Hor-P, Ver-P, and Dei-P. The heads of those projections are realized as verbs (albeit semi-grammaticalized, as argued in Chapter 2) that encode spatial axes.

In section 4.3, I will look at how these three coordinates are linguistically expressed in Mandarin by examining the utterances participants produced in response to the prompts. The section will be organized according to the number of dimensions depicted by the prompts, from one dimension to three dimensions. The syntactic patterns observed in these utterances will show some interesting constraints that are different from what has been found in certain languages, such as Mayangna and GSP. Section 4.3.6 will be a summary of those constraints and patterns. One set of constraints, which I will term *the Problem of PATH*, will be the focus of sections 4.5 and 4.6.

Section 4.4 will address one important aspect of my hypothesized structure in Chapter 1 (see (6)), namely, that PATH and MANNER are distinct syntactic components. As already argued in Chapter 1, these two components form a head chain, unlike some Romance languages where MANNER is an adjunct. I will argue that the distinction between PATH and MANNER has syntactic reality, evidenced by the fact that the behavior of the perfective aspect marker *-le* is sensitive to this distinction.

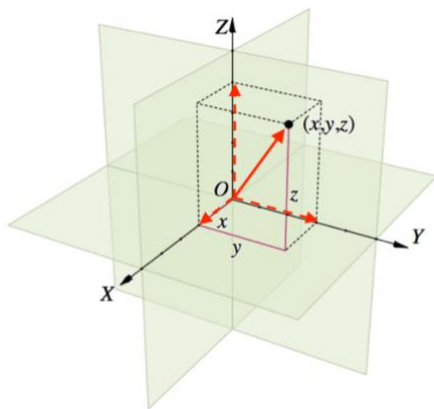
In section 4.5, I will focus on *the Problem of PATH*—a set of Mandarin-specific constraints that require (1) a PATH to have maximally two motion morphemes at a time, with one of which being deictic, and (2) a horizontal or vertical morpheme to take either an XP_{Loc} or Dei-P. I will propose a solution to the problem that involves binding and the notion of spatial anchoring. It will be shown that the solution not only explains the peculiar rules and constraints of PATH but also makes a few novel predictions that turn out to be correct. Section 4.6 will ask whether my proposed

solution to *the Problem of PATH* is plausible from the perspective of language acquisition, and I will make a few speculative remarks on what input children are likely to get from the environment and what cognitive mechanisms may be required for the acquisition of the Mandarin path. Finally, section 4.7 will conclude this chapter.

4.2 Complex Path: 3-D Vectorization

The notion of *path* adopted for this work was first proposed by Benedicto and Salomón (2014), who conceptualized it as a vector in a space represented by a Cartesian coordinate system (see (65)).

(65) A Cartesian representation of a path



(Benedicto and Salomon 2014)¹³

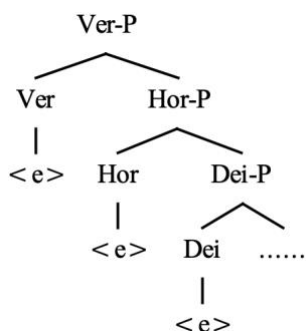
In this system, a path is a vector that may be broken down into a set of coordinates, each of which represents motion in relation to an axis. The path in (65), for example, is represented as a vector with a solid line going from the origin (0, 0, 0) to point (x, y, z). The vector involves changes of positions represented by the three dotted arrows. Assuming that the speaker or a reference point is somewhere on the X-axis, and that Earth's gravitational force operates parallel to the Z-axis, these dotted arrows can be conceived as vertical, horizontal, and deictic motion, which are changes of positions in relation to the Z-axis, Y-axis, and X-axis, respectively. The path in (65), therefore, involves changing positions vertically, horizontally, and deictically all at once. Put differently, a figure undergoing translational motion along this path will change its position with respect to the

¹³ The figure is credited by Benedicto and Salomón (2014), as taken from http://en.wikipedia.org/wiki/Euclidean_space.

vertical, horizontal, and deictic dimensions constructed by the three axes. In a Cartesian coordinate system, changes of positions like this are indicated by changes of values in the three coordinates (e.g., from (0, 0, 0) to (x, y, z)).

This conceptualization of a path has two important implications. First, as hypothesized in Chapter 1, there are three projections in the PATH component: Ver-P, Hor-P, and Dei-P (see (66)). They form an important part of the exoskeleton of PATH. The three coordinates / dimensions in the Cartesian system in (65) map onto the three projections in the exoskeleton in (66), although we will see in the following sections that the mapping between the geometric path and the linguistic PATH is not perfect.

(66) Three projections constituting the exoskeleton of PATH



Second, notice how the vector in (65) is described in terms of coordinates, (0, 0, 0) for its tail and (x, y, z) for its head. Since coordinates mark positions in a Cartesian coordinate system, it means the vector has to be “anchored” somewhere in the space represented by the system, as opposed to having the freedom to be anywhere. Therefore, conceptualizing a path as a vector would entail that a path must exist in some place that can be referred to or can be described in relation to a referential location. Put plainly, a motion event must take place somewhere as opposed to anywhere in the world. Of course, I do not mean this is the only way the human mind can conceive of motion, but as I will show in later sections, it is how motion events are represented and expressed in Mandarin motion predicates.

Let us now turn to the data and see how the three dimensions map onto the three projections in PATH.

4.3 Patterns in the Data

In this very long section, we will look at the data and see what syntactic patterns were produced by the participants in response to prompts depicting motion in one, two, and three dimensions. This will allow us to see how the vertical, horizontal, and deictic dimensions map onto the PATH component of motion predicates and what rules or constraints govern this mapping.

The section is organized as follows. Each of the following sub-sections is focused on one of five types of prompts and the syntactic patterns it elicited. These five types of prompts are: (i) prompts depicting changes of positions in the horizontal dimension only, (ii) prompts depicting changes of positions in the vertical dimension only, (iii) prompts depicting changes of positions in the horizontal and deictic dimensions, (iv) prompts depicting changes of positions in the horizontal and vertical dimensions, and (v) prompts depicting changes of positions in all three dimensions. The discussion will proceed from the simplest types, i.e., (i) and (ii), to the most complex type, i.e., (v).

Each type of prompts elicited a variety of syntactic patterns. Since this chapter is about the PATH component, the syntactic patterns will be discussed in an order that reflects their relevance to this component, from the most relevant to the least relevant. I will first look at patterns that consist of motion morphemes corresponding to horizontal, vertical, and deictic motion. Then, I will look at predicates consisting of either an ingressive or egressive morpheme in conjunction with a deictic morpheme. This will be followed by a discussion on predicates that have an ingressive or egressive morpheme without a deictic. After the patterns above have been examined, the focus will shift to those in which the presence of PATH is somewhat debatable. Among those patterns, I will first look at predicates with morphemes denoting the reaching of a goal, followed by a discussion on what I call directional phrases. A good case can be made that these two kinds of predicates still have a PATH, albeit a covert one or one that looks different from the exoskeleton in (66). Then, I will examine what I call orientational phrases, followed by a discussion on a pattern that consists of a manner verb and the morpheme *zai* (“be-at”). It is unclear whether there is a PATH in these patterns, but chances of there being one seem smaller compared to the previous two patterns. Finally, I will discuss predicates that have a MANNER component but clearly do not have a PATH.

After the data are presented and discussed, it will be clear that the syntax of PATH in Mandarin exhibits a number of interesting rules and constraints, some of which will be the focus of sections 4.5 and 4.6.

4.3.1 One-Dimensional Path—Horizontal Only

Let us begin with prompts that only depict changes of positions in the horizontal dimension. There are 19 such prompts, in response to which the participants produced 64 predicates in total¹⁴. Below are the syntactic patterns found in these predicates. I will discuss each of them one by one in the following sub-sections:

(67) Patterns found in the predicates corresponding to horizontal-only prompts:

	Syntactic pattern	Utterances in which the predicates that have the syntactic pattern are found	Total number of predicates that have the syntactic pattern
1	Horizontal + XP _{-Loc}	0108MANCT, 0113MANCT, 0113MANZM, 0114MANCT, 0211MANZM, 0212MANCT	6
2	Deictic	0108MANZM	1
3	Horizontal + Deictic	0108MANSD, 0108MANCT, 0113MANCT, 0211MANSD, 0211MANCT	5
4	Vertical + Deictic	0501MANSD	1
5	Ingressive/Egressive + Deictic	0203MANSD, 0212MANCT, 0220MANCT, 0504MANSD, 1505MANSD	5
6	Ingressive/Egressive	0202MANCT, 0203MANCT, 0204MANCT, 0212MANZM, 0220MANSD, 0501MANSD, 0501MANCT, 0501MANZM, 0502MANCT, 0502MANZM, 0504MANCT, 0504MANZM, 0509MANSD, 0509MANCT, 0509MANZM, 1505MANCT, 1505MANZM, 1506MANSD, 1506MANCT, 1506MANZM, 1509MANSD, 1509MANCT, 1509MANZM, 1510MANSD, 1510MANCT, 1510MANZM	26
7	<i>Dao</i> (“arrive”) + XP _{-Loc}	0114MANSD, 0204MANSD, 0220MANCT, 0502MANSD	4
8	(Post-Manner-V) directional phrases	0201MANSD, 0212MANSD, 0219MANCT, 0219MANZM	4
9	(Pre-Manner-V) orientational phrases	0113MANSD, 0114MANZM, 0203MANZM, 0220MANZM, 1510MANCT, 0219MANSD	6
10	Manner-V + be-at + XP _{-Loc}	0114MANZM, 0202MANSD, 0202MANZM, 0204MANZM	4
11	Manner-V	0201MANCT, 0201MANZM	2
	Total		64

¹⁴ I use the term *predicate* instead of *utterance* here because it is the level most relevant to the analysis presented in this dissertation. One utterance may have more than one motion predicate, e.g., “The paper plane flew over a fence and then went into a waste basket.”

4.3.1.1 Pattern 1: Horizontal + XP-Loc

Six predicates have in their PATH components the morpheme *guo* (“cross”) and an XP-Loc as its complement. See (69) for its syntactic structure. The XP-Loc triggers the reading of boundary crossing, as evidenced by the correlation between this pattern and the presence of boundaries in the prompts. The list in (68) shows that all six predicates correspond to prompts that clearly show a boundary. Furthermore, in each predicate, the XP-Loc refers to the boundary in the corresponding prompt. Sentence (70) is an example.

(68)

Utterances in which pattern 1 is found	Is there a boundary in the prompt? If so, what is it?
0108MANCT	Yes, a river
0113MANCT	Yes, a river
0113MANZM	Yes, a river
0114MANCT	Yes, a river
0211MANZM	Yes, a fence
0212MANCT	Yes, a fence

(69) [**guo** [XP-Loc]] → boundary crossing

(70) you yi ge xiaohai jiang zhifeiji she **guo-le** zhalan.¹⁵
have one CL child JIANG¹⁶ paper-plane shoot **cross**-PFV fence
[0211MANZM]

“There is a child throwing a paper plane **over** the fence.”

4.3.1.2 Pattern 2: Deictic

One predicate has only the deictic morpheme *qu* (“go”) in its PATH (see (72)). The participant used *qu* even though the prompt only showed horizontal motion. The reason may be that she did

¹⁵ The XP-Loc *zhalan* in this example is the complement of *guo*, despite the fact that the aspect marker *-le* is linearly between *guo* and *zhalan*. In this dissertation, it is assumed that *guo* undergoes head movement to Asp⁰ and becomes a stem for the suffix *-le*, resulting in the linear word order seen in the example.

¹⁶ The morpheme *jiang* has syntactic properties very similar with—if not identical to—the properties of *ba*. Huang et al. (2009) propose the following structure for *ba*, which should be applicable to *jiang* as well:

[_{baP} Subject [_{ba'} *ba* / *jiang* [_{VP} NP [_{V'} *v* [_{VP} V (XP)]]]]]

not use herself as the deictic center; rather, she took the perspective of the figure in the prompt and made it the deictic center, thereby licensing the use of *qu*.

(71) [Dei-P **qu**]

(72) yuan fang you zhi xiaoniao cong he'an dui mian de shu shang
far side have CL little-bird from riverbank opposite face DE tree top

wang he'an lingwai yi mian de shu shang fei **qu**
toward riverbank other one face DE tree top fly **go**

[0108MANZM]

“There is a birdie in the distance flying from the top of a tree that is on the opposite side of the riverbank toward the top of a tree that is on the other side of the bank.”

4.3.1.3 Pattern 3: Horizontal + Deictic

One recurring pattern is the combination of *guo* (“cross”) with a deictic morpheme, i.e., *lai* (“come”) or *qu* (“go”). Five predicates have this pattern in their path components, which have the structure in (73). Interestingly, even though all five predicates correspond to prompts that show boundaries, none of the predicates has in its path an XP_{-Loc} that refers to any of those boundaries. Sentence (74) is an example.

(73) [Hor-P **guo** [Dei-P **lai**]]

[Hor-P **guo** [Dei-P **qu**]]

(74) hetang zuo fang guanmucong shang you yi zhi niao
pond left side bush top have one CL bird

xiang hetang you fang de guanmucong fei-le **guo qu.**
toward pond right side DE bush fly-PFV **cross go**

[0108MANSD]

“There is a bird on top of the bush to the left of the pond flying **over** toward the bush to the right of the pond.”

4.3.1.4 Pattern 4: Vertical + Deictic

One predicate has the morpheme *xia* (“go-down”) and the deictic morpheme *qu* (“go”), with the structure in (75). This may seem a bit unexpected at first glance because *xia* denotes downward motion, not horizontal motion. But a quick look at prompt 0501 (see Figure 4.1), which this predicate (see (76)) corresponds to, reveals how easily the motion event may be perceived as downward motion:

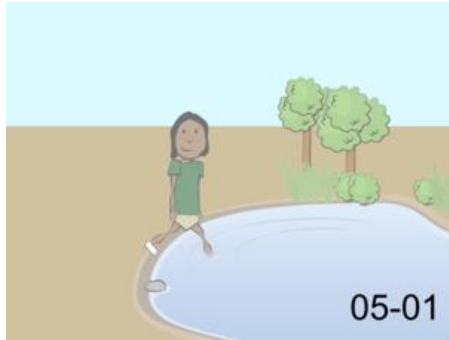


Figure 4.1: Prompt 05-01

(75) [Ver-P **xia** [Dei-P **qu**]]

(76) chitang bianyuan de yi wei nühai wang chitang nei zou-le **xia qu**
 pond edge DE one CL girl toward pond inside walk-PFV **go-down go**
 [0501MANSD]

“A girl on the edge of the pond walked down toward the inside of the pond.”

The prompt shows that a person is on her way into a pond, with one of her feet apparently submerged in water. And since a pond must have depth to hold water, it is quite natural to infer that the person is descending. Therefore, the use of *xia* here is not a mistake but a perfectly natural response based on our naïve physics and knowledge about ponds.

4.3.1.5 Pattern 5: Ingressive / Egressive + Deictic

Five predicates have either an ingressive or egressive morpheme in combination with a deictic, which happens to be *qu* (“go”) in all five cases (see (78) for their structure). In Mandarin, ingressive motion is denoted by *jin* or *ru* (though the participants only produced *jin* here), whereas egressive motion is denoted by *chu*.

(77)

Utterances in which pattern 5 is found	What morphemes are used
0203MANSD	Chu (“exit”) + qu (“go”)
0212MANCT	Chu (“exit”) + qu (“go”)
0220MANCT	Chu (“exit”) + qu (“go”)
0504MANSD	Jin (“enter”) + qu (“go”)
1505MANSD	Jin (“enter”) + qu (“go”)

As the ID numbers in (77) indicate, three predicates correspond to three prompts from series 2, the theme of which is a girl throwing a paper airplane. These three utterances have the morpheme *chu* (“exit”), which describes the paper plane exiting the girl’s hand. The other two predicates have the morpheme *jin* (“enter”), one corresponding to prompt 0504, the other 1505 (see below).

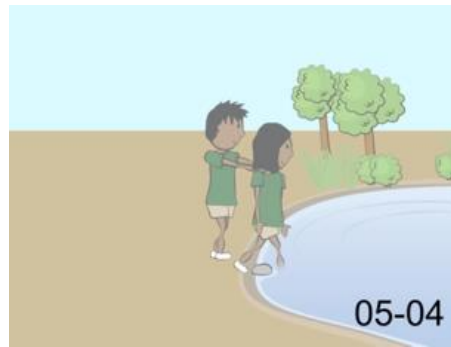


Figure 4.2: Prompt 05-04

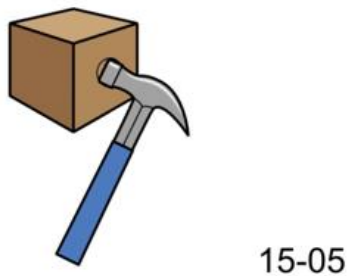


Figure 4.3: Prompt 15-05

In prompt 0504, one of the girl's feet is already submerged in the water when the video ends. In prompt 1505, the peg is hammered into the cube. In each event, the figure is entering some area or space, and it is easy to see how the participant construed them as ingressive events. Sentence (79) is an example.

(78) [Ing / Egr-P **jin** / **chu** [Dei-P **qu**]]

(79) yi ge chuizi jiang yi ge fangkuai shang de muding
one CL pond JIANG one CL cube top DE wood-nail

qiao-le **jin** **qu**.

knock-PFV **enter** go

[1505MANSD]

“A hammer hammered a wooden nail that was on a cube into (that cube).”

4.3.1.6 Pattern 6: Ingressive / Egressive

26 predicates have an ingressive or egressive morpheme without any of the morphemes that denote motion in the three dimensions. That is, the paths in these predicates do not have Hor-P, Ver-P, or Dei-P. However, the ingressive and egressive do have a translational motion reading, and one can argue that they are also part of PATH. Except three of them, these predicates also have an XP-Loc as the complement of the ingressive or egressive morpheme. Table (80) is a summary of these 26 predicates:

(80)

Prompt Series	Utterances in which pattern 6 is found		Does the ingressive / egressive morpheme have an XP _{-Loc} complement?	If there is an XP _{-Loc} complement, what does it refer to?
Series 2	Ingressive is used	0202MANCT, 0204MANCT, 0212MANZM	Yes	The bucket / Inside of the bucket
	Egressive is used	0203MANCT, 0220MANSD	No	
Series 5	Ingressive is used	0501MANSD, 0501MANCT, 0501MANZM, 0502MANCT, 0502MANZM, 0504MANCT, 0504MANZM, 0509MANSD, 0509MANCT, 0509MANZM	Yes, except 0501MANZM	The water or the pond
Series 15	Ingressive is used	1505MANCT, 1505MANZM, 1506MANSD, 1506MANCT, 1506MANZM, 1509MANSD, 1509MANCT, 1509MANZM, 1510MANSD, 1510MANCT, 1510MANZM	Yes	The cube / Inside of the cube

Five predicates correspond to prompts from series 2, the theme of which is a girl throwing out a paper plane. Two of them have the egressive morpheme *chu* (“exit”), meaning the plane exiting the girl’s hand. Neither of them takes an XP_{-Loc} as a complement. (See (81) for the structure and (82) for an example.) The other three have the ingressive *jin* or *ru* (both meaning “enter”), and they correspond to prompts in which the plane flies into a bucket full of scrap paper. All three ingressive morphemes take an XP_{-Loc} as a complement, which refers to the (inside of the) bucket.

Ten predicates correspond to prompts from series 5, the theme of which is a girl either walking or being pushed into a pond. All ten of them have ingressive morphemes. As explained earlier, it is easy to construe the pond as an ingressive space that the figure enters, especially because by the end of each prompt, one can see that one or both of the girl’s feet are submerged in water. Except for 0501MANZM, all the ingressive morphemes merge with an XP_{-Loc} that refers to the water or the pond. (See (83) for the structure and (84) for an example.) Note that even though 0501MANZM does not have an XP_{-Loc} complement for the ingressive morpheme *ru*, one must interpret the predicate as there being a space or area for the figure to enter.

The other 11 predicates, all of which have an ingressive morpheme, correspond to prompts from series 15, in which a peg is hammered into a cube in various ways. All of the 11 predicates have *jin* or *ru* (“enter”) taking an XP_{-Loc} complement that refers to the (inside of the) cube.

(81) [Egr-P **chu**] → exiting

(82) yi ge nühaizi jiang feiji wang qian fang diu **chu**.
 one CL girl jiang plane toward front side throw **exit** [0203MANCT]
 “A girl throws the plane **out** and forward.”

(83) [Ing-P **jin** / **ru** ([XP-Loc])] → entering (a space or area)

(84) chitang bianyuan de yi wei nühai zou **jin** chitang nei.
 pond edge DE one CL girl walk **enter** pond inside [0501MANSD]
 “A girl on the edge of the pond walks **into** the pond.”

4.3.1.7 Pattern 7: *Dao* (“arrive”) + XP-Loc

There are four predicates that have the morpheme *dao* (“arrive”) and an XP-Loc complement that denotes a goal. With a meaning of arrival, *dao* plays a crucial role in giving a motion predicate a telic reading. I will discuss the role it plays in detail in Chapter 5, which is about telicity. For now, the pattern’s syntactic structure is given in (86), and an example is given in (87). Notice that even though there are no morphemes for horizontal, vertical, and deictic motion in the example below, its interpretation is still necessarily one of translational motion. Put differently, we must interpret (87) as the girl moving from point A (somewhere outside the pond) to point B (inside the pond), and A and B are not the same¹⁷. With two different points in space, a vector can then be drawn. (Recall that a vector is a Cartesian representation of a path.) This is why one may argue for the presence of a covert PATH in predicates having this syntactic pattern.

(85)

Utterances in which pattern 7 is found	Is the prompt labeled as telic or atelic?
0114MANSD	Telic
0204MANSD	Telic
0220MANCT	Atelic
0502MANSD	Telic

(86) [End-P **dao** [XP-Loc]] → arriving at a goal

¹⁷ This is true even if we ignore the phrase *chitang bianyuan* (“pond edge”), which provides information about the initial position of the girl.

- (87) chitang bianyuan de yi wei nüsheng zou **dao** chitang li mian.
 pond edge DE one CL girl walk **arrive** pond inside face

[0502MANSD]

“A girl on the edge of the pond walks **into** *the pond*.”

Careful readers may notice that one of the predicates listed in (85)—0220MANCT—corresponds to an atelic prompt that depicts a girl shooting a paper plane toward a waste basket. The prompt ends before the plane reaches the basket. When asked about it in a follow-up interview, the participant said she had not noticed that the plane didn’t actually reach the basket, and that she had thought it did, hence the use of *dao* in her utterance.

4.3.1.8 Pattern 8: (Post-Manner-V) Directional Phrases

Four predicates have directional phrases that specify the direction in which a figure is moving. These phrases are headed by either *wang* or *xiang* (“toward”), which takes an XP-_{Loc} complement. The phrases all appear with a linearly preceding Manner-V and have the structure in (88). An example sentence is given in (89).

- (88) [Manner-VP Manner-V [Direction-P **wang** / **xiang** [XP-_{Loc}]]] → moving toward some location

- (89) feiji fei **xiang** yi ge shuitong.
 plane fly **toward** one CL bucket

[0219MANCT]

“The plane is flying **toward** *a bucket*.”

Directional phrases have two important properties. First, they appear to have a translational motion interpretation. Unlike their pre-Manner-V counterparts (which will be discussed in the next sub-section), they cannot co-occur—at least not without sounding awkward—with verbs for non-motion events, e.g., *kan* (“look”). The presence of a directional phrase in a predicate also seems to preclude the appearance of morphemes for horizontal, vertical, deictic, ingressive, and egressive motion, as nowhere in our dataset can we find even one such example. (Also, see the judgment of

sentence (90) below.) This complementary distribution suggests that a directional phrase constitutes a PATH by itself¹⁸.

- (90) feiji fei (*guo qu) **xiang** yi ge shuitong (*guo qu).
 plane fly (*cross go) **toward** one CL bucket (*cross go)
 “The plane is flying across **toward** a bucket.”

Second, the XP-_{Loc} merged with the head of a directional phrase has to be referential. Put differently, the XP-_{Loc} must denote some location that exists (i.e., can be referred to) in the event, thereby anchoring the path in space. (Recall the discussion about anchoring a vector in section 4.2.) The sentence below is ungrammatical without *mian* or *fang*, both of which are localizers that yield a referential reading:

- (91) you ge xiaohai ba zhifeiji diu **wang** qian *(mian/fang).
 have CL child BA paper-plane throw **toward** front *(face/side).
 “There is a child throwing the paper plane **toward** the front.”

4.3.1.9 Pattern 9: (Pre-Manner-V) Orientational Phrases

Six predicates have an orientational phrase that specifies the orientation of a vector (not the orientation of a figure, though). They are all headed by the morpheme *wang* (“toward”), which takes an XP-_{Loc} as a complement. In all six predicates, the orientational phrases are linearly followed by a Manner-V. The structure is shown in (92), and an example sentence is given in (93):

- (92) [[Orientation-P **wang** [XP-_{Loc}]]...[Manner-V' Manner-V...]]¹⁹

¹⁸ This statement may be a bit simplistic because it ignores the semantic differences between *wang* and *xiang*—a topic that cannot be fully explored in detail in this chapter.

¹⁹ What is important about this structure is that the orientational phrase is higher than the Manner-V. That is, the orientational phrase must merge with some node that dominates the Manner-V. One can verify this structure by using the following replacement test. In Mandarin, the phrase *gan shenme* (“do what”) replaces a verb phrase, not a verb:

- | | | |
|--|--|---|
| i) Ta yao mai yi tai che.
3 rd want buy one CL car
“S/he wants to buy a car.” | ii) *Ta yao gan shenme yi tai che?
3 rd want do what one CL car
*“What does s/he want to do a car?” | iii) Ta yao gan shenme?
3 rd want do what
“What does s/he want to do?” |
|--|--|---|

- (93) you ge xiaohai ba zhifeiji **wang** *qian* diu.
 have CL child BA paper-plane **toward** *front* throw [0203MANZM]
 “There is a child throwing the paper plane forward.”

Notice that the XP-_{Loc} *qian* (“front”) is acceptable here, unlike what we saw in (91). This is because an orientational phrase does not constitute a PATH and therefore need not have a referential XP-_{Loc} as a spatial anchor. And if an orientational phrase by itself does not have a translational motion interpretation, it is no surprise that it is compatible with non-motion verbs like *kan* (“look”). Compare the following two sentences:

- (94) Wang xia mian kan.
 toward below face look
 “Look down.”
- (95) *Kan wang xia mian.
 look toward below face
 *“Look toward below.”

Moreover, we have seen in sentences (82) and (76) that orientational phrases can co-occur with motion morphemes that constitute PATH (*chu* (“exit”) in (82) and *xia qu* (“go-down go”) in (76)). But as mentioned in the last section, directional phrases don’t seem to share this property. Consider, for example, moving the orientational phrase *wang qian fang* (“forward”) in (82) to a

The unacceptability of sentence (ii) is due to the replacement of the verb *mai* (“buy”) with *gan shenme*. In contrast, (iii) is acceptable because *gan shenme* replaces *mai yi tai che* (“buy a car”), which is a verbal constituent rather than a verb. Now, consider the following conversation between A and B. Not sure what he just heard, B asks a question by replacing *diu yi ke shouliudan* with *gan shenme*. This would be impossible if the Manner-V *diu* merged with the orientational phrase *wang xia* directly, instead of projecting into a constituent before the merge.

- iv) A: Ta wang xia diu yi ke shouliudan.
 3rd toward below throw one CL grenade
 A: “S/he threw a grenade downward.”
- B: Deng deng, ni shuo ta wang xia gan shenme?!
 wait wait 2nd say 3rd toward below do what
 B: “Wait, what did you say s/he did downward?!”

position after the Manner-V *diu* (“throw”) and making it a directional phrase. The resulting sentence will not be acceptable unless the egressive morpheme *chu* is taken out:

- (96) *yi ge nühaizi jiang feiji diu (*chu) wang qian fang (*chu).*
 one CL girl JIANG plane throw (*exit) **toward** front side (*exit)
 “A girl throws the plane out and forward.”

4.3.1.10 Pattern 10: Manner-V + be-at + XP-Loc

Four predicates have a Manner-V and the morpheme *zai* (“be-at”), which takes an XP-Loc complement. All of them correspond to telic prompts, and the XP-Loc’s merged with *zai* refer to places reached by the figures in those prompts. The structure and an example are given below:

- (97) [Manner-VP Manner-V [Zai-P **zai** [XP-Loc]]]

- (98) *you ge zhifeiji luo zai lesetong shang.*
 have CL paper-plane fall **be-at** trash-can top [0202MANZM]
 “There is a paper plane falling on the trash can.”

In the beginning of section 4.3 I mentioned it is unclear whether there is really a PATH in this syntactic pattern. The reason is that this pattern does not always yield a translational motion reading. Rather, a motion reading is only available in the presence of a few certain manner verbs, *luo* (“fall”) being one of them. Should *luo* in (98) change to a different Manner-V, say, *fei* (“fly”), the translational motion reading will disappear, and the XP-Loc will be interpreted as the area in which the flying takes place rather than the goal reached by the paper plane.²⁰ It is also worth noting that *fei* (“fly”) is an apt manner verb for what is depicted in prompt 0202, but that the verb actually used by the participant, i.e., *luo* (“fall”), is *not* felicitous for this horizontal motion event.

²⁰ Why is it so? In Chen (2017) I suggested that insofar as there is any translational motion reading out of (97), it comes from world knowledge associated with the manner verb. In other words, the syntactic structure really has no PATH, and the choice of manner verb—specifically, concepts associated with the verb—heavily determines the presence or absence of a motion reading. For instance, *luo* (“fall”) is associated with a kind of motion that is translational, whereas *fei* (“fly”) is not exclusively associated with such motion. Hence, an event of *flying in circles* is easier to imagine than an event of *falling in circles*.

(Recall that the prompts we have been discussing thus far only depict horizontal motion.) It is possible that the participant chose *luo* over *fei* because only the former is one of those few manner verbs in Mandarin that can yield a motion reading of structure (97).

The table below shows the Manner-V's used for these four predicates by the participants.

(99)

Utterances in which pattern 10 is found	What manner verbs are used
0114MANZM	Ting (“stop”)
0202MANSD	Ting (“stop”)
0202MANZM	Luo (“fall”)
0204MANZM	She (“shoot”)

4.3.1.11 Pattern 11: Manner-V

There are two predicates that consist only of a Manner-V. They happen to correspond to the same prompt: 0201. Incidentally, both of them are inside of a relative clause that modifies the figure.

(100) [Manner-VP **Manner-V**]

(101) you yi ge zhengzai **feixing** de zhifeiji
have one CL PROG **fly** DE paper-plane [0201MANZM]
“‘There is a paper plane that is **flying**.”

It is clear that this last syntactic pattern does not have a path. One can use sentence (101), for example, to talk about a paper plane that is flying in circles, in which case the plane is always starting and ending up at the same point. Such motion cannot be captured by a vector in a Cartesian coordinate system.

4.3.2 One-Dimensional Path—Vertical Only

There are 24 prompts that depict changes of positions only in the vertical dimension. Below are 10 syntactic patterns found in the 77 predicates that correspond to those prompts. I will discuss these patterns one by one in the following sub-sections.

(102) Patterns found in the utterances corresponding to vertical-only prompts:

	Syntactic pattern	Utterances in which the predicates that have the syntactic pattern are found	Total number of predicates that have the syntactic pattern
1	<i>Qi</i> (“rise”)	0609MANSD, 0609MANCT, 1105MANCT	3
2	<i>Xia</i> (“go-down”)	1107MANCT, 1108MANCT, 1108MANZM, 1109MANCT, 1110MANCT	5
3	Vertical + Deictic	0609MANZM, 1012MANCT, 1013MANCT(1), 1013MANCT(2), 1104MANSD, 1104MANCT, 1104MANZM, 1105MANSD, 1105MANCT, 1105MANZM, 1106MANSD, 1106MANCT, 1107MANZM, 1108MANSD, 1109MANSD, 1110MANSD, 1201MANSD, 1201MANCT, 1202MANCT, 1303MANCT(1), 1303MANCT(2), 1304MANSD, 1304MANZM, 1306MANSD, 1306MANCT, 1307MANCT, 1307MANZM, 1308MANCT	28 An ID with a number in parentheses indicates that the utterance contains more than one predicate that has syntactic pattern 3.
4	Ingressive + Deictic	1504MANSD	1
5	Ingressive + XP- _{Loc}	1013MANZM, 1502MANSD, 1502MANCT, 1502MANZM, 1503MANSD, 1503MANCT, 1503MANZM, 1504MANCT, 1504MANZM, 1507MANSD, 1507MANCT, 1507MANZM, 1508MANSD, 1508MANCT, 1508MANZM	15
6	<i>Dao</i> (“arrive”) + XP- _{Loc}	1012MANCT, 1106MANZM, 1302MANSD, 1302MANZM, 1306MANZM, 1308MANSD, 1502MANSD	7
7	<i>Shang</i> (“get-onto”) + XP- _{Loc}	1304MANCT, 1304MANZM	2
8	(Pre-Manner-V) orientational phrases	1012MANSD, 1107MANSD, 1302MANCT, 1303MANSD, 1303MANZM, 1307MANSD	6
9	Manner-V + be-at + XP- _{Loc}	1013MANSD, 1109MANZM, 1110MANZM	3
10	Manner-V	1201MANZM, 1202MANSD, 1202MANZM, 1203MANSD, 1203MANCT, 1203MANZM, 1308MANZM	7
	Total		77

4.3.2.1 Pattern 1: *Qi* (“rise”)

Three predicates have only the morpheme *qi* (“rise”) in their PATH components. One corresponds to prompt 11-05, which depicts a dispositional change²¹. The other two correspond to prompt 6-9, in which a goose is sitting on the ground initially and then is picked up by a boy. *Qi* in these sentences is interpreted as “leaving the origin by moving upward.” Importantly, what

²¹ The term “dispositional change” is used in this dissertation to mean a change in the configuration of parts of an object or person with respect to each other. An example would be a person standing up from a sitting position. “Dispositional change” is derived from the term “disposition,” which is adopted by Bohnemeyer and Brown (2007) to mean a number of things, one of which is configuration of (body) parts.

leaves an origin need not be a figure; instead, it can be a part of a figure. Below is prompt 11-05, where the red circle indicates the origin while the arrow represents an upward vector. Even though the child as a whole does not undergo translational motion, a part of his body clearly leaves the red circle and moves upward.



Figure 4.4: Prompt 11-05

The structure of PATH in these instances is in (103). An example is in (104), with the relevant predicate underlined:

(103) [_{Ver-P} **qi**] → A figure or part of it leaves its original location by moving upward.

(104) yi ge nanhai bao qi-le yi zhi e xiang you fang zou qu.
 one CL boy hold **rise**-PFV one CL goose toward right side walk go
 [0609MANSD]

“A boy picked up a goose and walked toward the right.”

4.3.2.2 Pattern 2: *Xia* (“go-down”)

Five predicates have the morpheme *xia* (“go-down”) in their PATHs. All of them correspond to prompts from series 11 that depict dispositional changes. Though the figure in each prompt does not undergo translational motion as a whole, part of his body clearly moves downward and ends up on the ground. Four of the predicates do not have an XP-_{Loc} (an example given in (107), with the relevant predicate underlined); one has an XP-_{Loc} that denotes the surface of the ground contacted by the figure’s body part as a result of the dispositional change.

(105)

Utterances in which pattern 2 is found	How does the figure's disposition change in the prompt?	Is there an XP _{-Loc} in the predicate?
1107MANCT	from standing to kneeling	No
1108MANCT	from standing to sitting	Yes: <i>di shang</i> (“surface of the ground”)
1108MANZM	from standing to sitting	No
1109MANCT	from standing to kneeling	No
1110MANCT	from standing to sitting	No

(106) [Ver-P **xia** ([XP_{-Loc})]²²

(107) daren fu-zhe xiaohai, manman zuo xia.
adult support-IMP child slowly sit **go-down** [1108MANZM]
“The adult is holding the child, (and the child) sits *down* slowly.”

4.3.2.3 Pattern 3: Vertical + Deictic

There are 28 predicates in which a vertical appears with a deictic. Nine of them have *qi lai* (“rise come”), three have *shang lai* (“go-up come”), 12 have *xia lai* (“go-down come”), and four have *xia qu* (“go-down go”). Although 18 of the 28 predicates correspond to prompts of dispositional change, the distinction between dispositional change and translational motion does not seem to play a significant role in the choice of morpheme. The reason is that, given the right context, any of the morphemes listed here can be used to describe dispositional change or translational motion.

²² It is unclear whether the XP_{-Loc} in this structure is the complement of *xia*. It may be that the XP_{-Loc} merges with a null element first before merging with *xia*. I am inclined to think it is the latter, but in either case, the XP_{-Loc} is embedded inside Ver-P.

(108)

Utterances in which pattern 3 is found	What morphemes are used?	Does the vertical morpheme merge with an XP _{-Loc} ?
0609MANZM, 1012MANCT, 1104MANSD, 1104MANCT, 1104MANZM, 1105MANSD, 1105MANCT, 1105MANZM, 1303MANCT(1)	Qi (“rise”) + lai (“come”) ²³	No
1303MANCT(2), 1304MANSD, 1304MANZM	Shang (“go-up”) + lai (“come”)	No
1013MANCT(1), 1013MANCT(2), 1106MANSD, 1106MANCT, 1107MANZM, 1201MANCT, 1202MANCT, 1306MANSD, 1306MANCT, 1307MANCT, 1307MANZM, 1308MANCT	Xia (“go-down”) + lai (“come”)	No
1108MANSD, 1109MANSD, 1110MANSD, 1201MANSD	Xia (“go-down”) + qu (“go”)	No

A structural feature shared by all 28 predicates is that they do not have an XP_{-Loc} in their PATH components. This is quite interesting because most of the prompts do display various kinds of surfaces—surfaces that the figure moves onto, via, or off of. And yet, none of the participants encoded any of those surfaces in the PATHs (though they sometimes mentioned them in a separate clause or an adjunct phrase). The pattern discussed here can be illustrated below.

(109) [Ver-P **qi** [Dei-P **lai**]] → A figure or part of it leaves its original location by moving upward.

(110) you yi ge xiaohai dun xia lai
have one CL child squat go-down come

yi ba ba e bao **qi lai** likai.
one hold BA goose hug **rise come** leave [0609MANZM]

“There was a child squatting down. (He) picked up the goose in one swoop and left.”

(111) [Ver-P **xia** [Dei-P **lai** / **qu**]] → moving downward

(112) yi ge nühai cong shu shang pa-le **xia lai**.
one CL girl from tree top climb-PFV **go-down come** [1306MANSD]

²³ It should be noted that the morpheme *qi* can only co-occur with *lai*, not *qu*. This is quite peculiar because other motion morphemes that we have talked about so far (*shang*, *xia*, *guo*, *jin*, and *chu*) can co-occur with either deictic morpheme. Why *qi qu* (“rise go”) is illicit deserves a detailed discussion that is outside the scope of this chapter.

“A girl climbed **down** from the top of the tree.”

(113) [Ver-P **shang** [Dei-P **lai** / **qu**]] → moving upward

(114) zuo zai shu shang de nüsheng jiang shu xia fang de nansheng
sit be-at tree top DE girl JIANG tree below side DE boy

la-le **shang** **lai**.

pull-PFV **go-up** **come**

[1304MANSD]

“The girl sitting on the tree pulled **up** the boy below the tree.”

The use of the deictic morphemes *lai* and *qu* is felicitous even though the motion depicted in these prompts is strictly vertical in the sense that it forms a vector completely parallel to the Z-axis (Recall the Cartesian coordinate system in 4.2.). As mentioned in section 4.3.1.2, the participants may not have used themselves as the deictic center when describing these events. When producing utterance (114), for instance, the participant may have taken the perspective of the girl on the tree and used her as the deictic center. Since the boy is moving closer to the girl, the use of *lai* (“come”) is licensed.

4.3.2.4 Pattern 4: Ingressive + Deictic

One predicate with an ingressive and a deictic morpheme (see (115)) corresponds to prompt 1504, which depicts a peg being hammered into a cube. The structure of this pattern and the reason why participants would choose to use an ingressive morpheme were already discussed in section 4.3.1.5.

(115) yi ge tiechui jiang yi ge fangkuai shang de muzhui
one CL hammer (n.) JIANG one CL cube top DE wood-peg

qiao-le **jin** **qu**.

hammer (v.)-PFV **enter** **go**

[1504MANSD]

“A hammer hammered a wooden peg that was on top of a cube **into** that cube.”

4.3.2.5 Pattern 5: Ingressive + XP-Loc

Fifteen predicates have either *jin* or *ru* (“enter”) along with an XP-Loc complement that denotes an ingressive space. One predicate corresponds to prompt 1013, which depicts a boy putting a pink ball into a brown container. The other 14 correspond to prompts from series 15, the theme of which is a peg entering or being hammered into a cube. All 15 prompts are marked as telic. We can see from the data that the ingressive aspect of the events from series 15 is highly salient to the participants, so much so that they did not even once mention the vertical motion of the peg.

(116)

Utterances in which pattern 5 is found	What morpheme is used?	What space does the figure move into in the prompt?	What does the XP-Loc refer to?
1013MANZM	Jin (“enter”)	Inside of a container	Inside of the container
1502MANSD	Ru (“enter”)	Inside of a cube	Inside of the cube
1502MANCT	Jin (“enter”)		
1502MANZM	Ru (“enter”)		
1503MANSD	Jin (“enter”)		
1503MANCT	Jin (“enter”)		
1503MANZM	Ru (“enter”)		
1504MANCT	Jin (“enter”)		
1504MANZM	Ru (“enter”)		
1507MANSD	Jin (“enter”)		
1507MANCT	Jin (“enter”)		
1507MANZM	Ru (“enter”)		
1508MANSD	Jin (“enter”)		
1508MANCT	Jin (“enter”)		
1508MANZM	Ru (“enter”)		

(117) [Ing-P **jin** / **ru** [XP-Loc]] → entering a space or area

(118) dingchui ba dingzi chui **ru**-le mutou zhong.
 hammer (n.) BA nail hammer (v.) **enter**-PFV wood middle [1503MANZM]
 “The hammer hammered the nail **into** the wood.”

4.3.2.6 Pattern 6: Dao (“arrive”) + XP-Loc

Seven predicates have the morpheme *dao* (“arrive”) along with an XP-Loc (see (121) for an example). As pointed out earlier, *dao* means “to arrive at a location” and therefore gives a motion predicate a telic reading. The XP-Loc complement of *dao* denotes a goal reached by a figure.

(119)

Utterances in which pattern 6 is found	Is the prompt labeled as telic or atelic?
1012MANCT	Atelic
1106MANZM	Telic
1302MANSD	Telic
1302MANZM	Telic
1306MANZM	Telic
1308MANSD	Telic
1502MANSD	Telic

(120) [End-P **dao** [XP-Loc]] → arriving at a goal

(121) you yi ge xiaohai cong shu shang manman pa **dao** shu xia.
 have one CL child from tree top slowly climb **arrive** tree below
 [1306MANZM]

“There is a child slowly climbing from the top of the tree *to* the bottom of the tree.”

In table (119), we can see that all but one predicate correspond to telic prompts. But why did one participant use *dao* for the atelic prompt 10-12 (see Figure 4.5 below), which shows a boy kneeling down with a ball and ends before the ball is placed inside a container by him. In a follow-up interview, the participant said she had thought the ball actually reached the container. Since the ball was so close to the container toward the end, and since there was no sign in the prompt suggesting that the boy’s action would be disrupted, her mind just automatically filled in what she thought would have happened.



10-12

Figure 4.5: Prompt 10-12

4.3.2.7 Pattern 7: *Shang* (“get onto”) + XP-_{Loc}

Two predicates have the morpheme *shang* (“get-onto”) and an XP-_{Loc} complement in their PATHs. See one of them in (124). The two predicates correspond to the telic prompt 1304, in which a boy is pulled onto a tree branch by a woman. In both instances, *shang* takes an XP-_{Loc} as its complement, which refers to the tree or tree branch on which the boy ends up sitting.

There is little doubt that the two predicates here denote motion events. Note, however, that *shang* in these instances seems to mean “get onto something” or “arrive on the surface of something” rather than upward motion. This is different from the phonologically identical *shang* we saw earlier in section 4.3.2.3, which does seem to have an upward motion reading. I shall revisit this point later when we examine more relevant data.

(122)

Utterances in which pattern 7 is found	What surface does the figure move onto in the prompt?	Does <i>shang</i> take an XP- _{Loc} complement?	What does the XP- _{Loc} refer to?
1304MANCT	The tree branch	Yes	The tree branch
1304MANZM	The tree branch	Yes	The tree

(123) [_{Shang-P} **shang** [XP-_{Loc}]] → moving onto something

(124) shu shang de guai ayi ba di shang de xiaohai
tree top DE strange lady BA ground top DE child

yi ba la **shang-le** shu.

one hold pull **get-onto**-PFV tree

[1304MANZM]

“The weird lady on the tree pulled the child on the ground *onto* the tree with one action.”

4.3.2.8 Pattern 8: (Pre-Manner-V) Orientational Phrases

Six predicates have an orientational phrase headed by *wang* (“toward”). An example is given in (125). Two things about (125) are worth mentioning. First, as already pointed out in section 4.3.1.9, orientational heads can take a non-referential localizer such as *xia* (“below”) as their complement. This is not acceptable for directional heads. Second, the example here corresponds to a dispositional change event rather than a translational motion event, and the use of the

orientational phrase is perfectly acceptable. However, one cannot use a directional phrase to describe a dispositional change. In (126), even though the XP_{-Loc} *xia fang* satisfies the referentiality requirement for being a directional head's complement, the sentence is still not acceptable. Now, if my earlier suggestion that a post-Manner-V directional phrase constitutes a PATH (see section 4.3.1.8) is on the right track, then it is no surprise that (126) is unacceptable: PATH yields a translational motion interpretation, and yet dispositional change is by definition *not* translational motion.

- (125) yi ge daren qian-zhe xiaohai de shou yindao ta **wang** xia **gui**.
 one CL adult pick-IMP child GEN hand guide 3rd **toward** below **kneel**
 [1107MANSND]

“An adult, holding a child's hand, guides him through the process of **kneeling** down.”

- (126) *yi ge daren yindao ta gui wang xia fang.
 one CL adult guide 3rd kneel toward below side
 “An adult guides him through the process of kneeling down.”

4.3.2.9 Pattern 9: Manner-V + be-at + XP_{-Loc}

Three predicates with a Manner-V and a *zai* (“be-at”) phrase correspond to three telic prompts. Two of them depict dispositional changes. The other depicts a boy putting a ball into a container (see (128)). Table (129) shows the manner verbs that were used by the participants.

- (127) [$Manner-VP$ $Manner-V$ [$Zai-P$ **zai** [XP_{-Loc}]]]

- (128) yi ge nansheng jiang yi ke fenhongse de qiu
 one CL boy JIANG one CL pink DE ball

 fang **zai** chongwulan nei.
 put **be-at** pet-pen inside [1013MANSND]
 “A boy puts a pink ball in the pet pen.”

(129)

Utterances in which pattern 9 is found	What manner verbs are used?
0114MANZM	Fang (“put”)
0202MANSD	Gui (“kneel”)
0202MANZM	Zuo (“sit”)

4.3.2.10 Pattern 10: Manner-V

Seven predicates have a MANNER component but no PATH. One of them corresponds to prompt 1308, which depicts a boy being lowered down from a tree branch to the ground. The other six describe events of dispositional change depicted by the prompts from series 12, the theme of which is a bottle changing from a standing to a lying position. It should be noted that five of them also have a resultative verb that denotes the “fallen” state of the bottle. The seven predicates are summarized below:

(130)

Utterances in which pattern 10 is found	What manner verb is used?	What resultative verb is used, if any?	What kind of event does the prompt depict?	Is the depicted event telic or atelic?
1201MANZM	Dao (“fall”)	None	Dispositional change	Telic
1202MANSD	Fang (“put”)	Dao (“fall”)		
1202MANZM	Fang (“put”)	Dao (“fall”)		
1203MANSD	Tui (“push”)	Dao (“fall”)		
1203MANCT	Tui (“push”)	Dao (“fall”)		
1203MANZM	Tui (“push”)	Dao (“fall”)		
1308MANZM	Luo (“fall”)	None	Translational motion	

(131) you zhi shou ba pingzi **fang dao**.

have CL hand BA bottle **put fall** [1202MANZM]

“There is a hand putting the bottle on its side.”

4.3.3 Two-Dimensional Path—Horizontal and Deictic

This section is focused on prompts that depict changes of positions in both the horizontal and deictic dimensions as well as the 141 predicates they elicited. The table below shows the 12 syntactic patterns found in these predicates.

(132) Patterns found in the utterances for prompts with the horizontal and deictic dimensions:

	Syntactic pattern	Utterances in which the predicates that have the syntactic pattern are found	Total number of predicates that have the syntactic pattern
1	Horizontal + Deictic	0101MANSD, 0102MANSD, 0102MANCT, 0116MANCT, 0127MANSD, 0141MANCT, 0214MANCT, 0301MANSD, 0304MANZM, 0401MANSD, 0601MANSD, 0603MANSD, 0603MANZM, 0612MANSD, 0618MANCT, 0619MANSD, 0620MANCT, 0621MANSD, 0621MANCT, 0803MANSD, 0803MANCT, 0804MANCT, 0805MANSD, 0805MANCT, 0806MANSD, 1001MANSD, 1001MANCT	27
2	Deictic	0101MANZM, 0102MANZM, 0116MANZM, 0127MANZM, 0610MANSD, 0612MANCT, 0619MANZM, 0801MANSD, 0805MANZM	9
3	<i>Xia</i> (“go-down”)	0302MANZM, 0303MANZM, 0510MANSD, 0510MANZM	4
4	Horizontal + XP _{-Loc}	0116MANCT, 0117MANCT, 0118MANCT, 0213MANCT, 0214MANCT, 0402MANCT	6
5	Vertical + Deictic	0301MANCT, 0302MANCT, 0511MANSD	3
6	Ingressive/Egressive + Deictic	0115MANCT, 0117MANCT, 0118MANCT, 0139MANCT, 0602MANCT, 0801MANCT	6
7	Ingressive + XP _{-Loc}	0214MANCT, 0214MANZM, 0505MANCT, 0505MANZM, 0506MANCT, 0506MANZM, 0511MANCT, 0511MANZM, 0604MANCT, 0604MANZM, 1002MANCT, 1002MANZM, 1004MANCT, 1005MANCT, 1005MANZM	15
8	<i>Dao</i> or <i>zhi</i> (“arrive”) + XP _{-Loc}	0117MANSD, 0118MANSD, 0141MANSD, 0214MANSD, 0302MANSD, 0304MANSD, 0402MANSD, 0505MANSD, 0506MANSD, 0506MANCT, 0510MANCT, 0602MANSD, 0604MANSD, 0613MANSD, 0802MANCT, 1002MANSD, 1005MANSD	17
9	(Post-Manner-V) directional phrases	0115MANZM, 0140MANCT, 0303MANSD, 0402MANZM, 0602MANZM, 0611MANSD, 0611MANCT, 0618MANSD, 0619MANCT, 0620MANSD, 0802MANZM, 1001MANZM, 1004MANSD	13
10	(Pre-Manner-V) orientational phrases	0101MANCT, 0115MANSD, 0116MANSD, 0118MANZM, 0127MANCT, 0139MANZM, 0140MANSD, 0140MANZM, 0213MANSD, 0213MANZM, 0301MANZM, 0303MANCT, 0401MANCT, 0401MANZM, 0601MANCT, 0603MANCT, 0604MANZM, 0610MANCT, 0610MANZM, 0611MANZM, 0612MANZM, 0613MANCT, 0613MANZM, 0618MANZM, 0620MANZM, 0621MANZM, 0801MANZM, 0802MANSD, 0803MANZM, 0804MANSD, 0804MANZM, 0806MANCT, 0806MANZM, 1004MANZM	34
11	V + be-at + XP _{-Loc}	0117MANCT, 0117MANZM, 0141MANCT, 0141MANZM	4
12	Manner-V	0139MANSD, 0304MANCT, 0601MANZM	3
	Total		141

4.3.3.1 Pattern 1: Horizontal + Deictic

27 predicates have the morpheme *guo* (“cross”) and a deictic morpheme, with the structure in (134). Two important points should be made here: First, none of the 27 predicates has an XP-_{Loc}, which is consistent with what was discovered in section 4.3.1.3. Again, the absence of an XP-_{Loc} should be attributed to the syntax of PATH rather than the visual / perceptual module(s) of the mind, since in three of the prompts a boundary is clearly visible and could have been encoded in the PATHs. Second, unlike what was found in section 4.3.1.3, the vast majority of these predicates here correspond to prompts that do *not* show any discernible boundary, the exceptions being 0116MANCT, 0214MANCT, and 0401MANS. Thus, it appears that *guo* in the majority of these predicates does not yield a boundary-crossing interpretation. Sentence (135) is one example that corresponds to a prompt with no boundary (see Figure 4.6).

(133)

Utterances in which pattern 1 is found	Is there a boundary in the prompt? If so, what is it?	Is there an XP- _{Loc} in PATH?
0101MANS, 0102MANS, 0102MANCT, 0127MANS, 0141MANCT, 0301MANS, 0304MANZM, 0601MANS, 0603MANS, 0603MANZM, 0612MANS, 0618MANCT, 0619MANS, 0620MANCT, 0621MANS, 0621MANCT, 0803MANS, 0803MANCT, 0804MANCT, 0805MANS, 0805MANCT, 0806MANS, 1001MANS, 1001MANCT	No	No
0116MANCT	yes (a river)	
0214MANCT	yes (a fence)	
0401MANS	yes (a street)	

(134) [Hor-P_{guo} [Dei-P **lai**]]

[Hor-P_{guo} [Dei-P **qu**]]

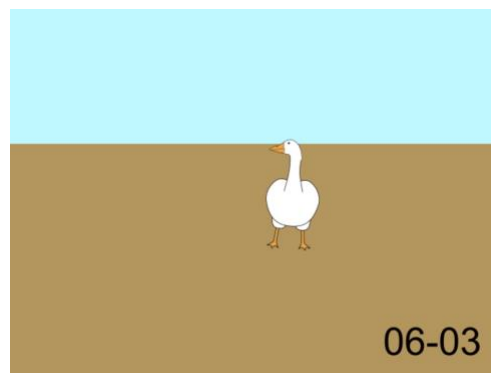


Figure 4.6: Prompt 06-03

- (135) yi zhi e zou-le guo lai.
 one CL goose walk-PFV cross come [0603MANSD]
 “A goose walked over toward here.”

4.3.3.2 Pattern 2: Deictic

Nine predicates have either *lai* (“come”) or *qu* (“go”) as the only morpheme in their PATHS. Their structure and an example are given below. As far as we can tell from the data, there are no systematic differences between prompts corresponding to this pattern and prompts corresponding to pattern 1 above. This is because seven of the nine prompts that elicited the nine predicates here also elicited predicates with pattern 1 (see (132)). What this means is that the choice between using just a deictic and using a deictic along with *guo* (“cross”) is likely due to personal preferences rather than some visual feature in the prompts. However, we will see in section 4.3.3.4 that this is not the case for the choice between using *guo* + XP-_{Loc} and using *guo* + deictic.

- (136) [Dei-P lai / qu]
 (137) yuan chu de xiaoniao wang qian fang fei lai.
 far place DE small-bird toward front side fly come [0127MANZM]
 “The birdie in the distance flies toward the area in front of the speaker.”

4.3.3.3 Pattern 3: Xia (“go-down”)

Four predicates have the morpheme *xia* (“go-down”) in their PATH components. Why does a morpheme that denotes vertical motion appear in the data for horizontal and deictic prompts? A quick look at the table below reveals the answer:

(138)

Utterances in which pattern 3 is found	What event does the prompt depict?	Does <i>xia</i> take an XP- _{Loc} ?	What does the XP- _{Loc} refer to?
0302MANZM	A boat floating down a river	No	N/A
0303MANZM	A boat with a man on it floating down a river	No	
0510MANSD	A boy pushing a girl into a pond	Yes	the pond
0510MANZM		Yes	the pond

Though the prompts are labeled as horizontal and deictic, our world knowledge about rivers and ponds tells us that some degree of verticality must be involved. After all, how could a river flow if it were completely horizontal? And how could a pond hold water if it had no depth? It is therefore entirely natural for the participants to have produced these utterances with *xia*.

It should be pointed out that an XP-_{Loc} appears in two of the predicates, and in both cases it refers to a pond (see below).

(139) [Ver-P **xia** ([XP-_{Loc}])]

(140) Yi ge nanhai ba yi ge nühai tui **xia-le** *shuichi*.
 one CL boy BA one CL girl push **go-down-PFV** *pond* [0510MANZM]
 “A boy pushed a girl down into the pond.”

4.3.3.4 Pattern 4: Horizontal + XP-_{Loc}

Six predicates have the morpheme *guo* (“cross”) along with an XP-_{Loc} complement. All six of them correspond to prompts with visible boundaries, which are referred to by the XP-_{Loc}’s. Based on these data and those in sections 4.3.1.1 and 4.3.3.1, we can now confidently conclude that this syntactic pattern (see (142)) yields a boundary-crossing reading, whereas *guo lai* (“cross come”) and *guo qu* (“cross go”) do not exclusively denote boundary crossing events. As I showed in 4.3.3.1, *guo lai* and *guo qu* may describe events that involve no boundary. This means the choice between merging *guo* with an XP-_{Loc} and merging it with a Dei-P is not a matter of personal preference. Rather, the choice has to do with the presence or absence of a discernible boundary in the prompt.

(141)

Utterances in which pattern 4 is found	Is there a boundary in the prompt? If so, what is it?	Does <i>guo</i> take an XP- _{Loc} complement? If so, what does it refer to?
0116MANCT	Yes, a river	Yes, the river
0117MANCT	Yes, a river	Yes, the river
0118MANCT	Yes, a river	Yes, the river
0213MANCT	Yes, a fence	Yes, the fence
0214MANCT	Yes, a fence	Yes, the fence
0402MANCT	Yes, a street	Yes, the street

(142) [**guo** [XP-_{Loc}] → boundary crossing

- (143) yi ge nūhaizi ba zhifeiji diu **guo** yi ge liba.
 one CL girl BA paper-plane throw **cross** one CL fence [0213MANCT]
 “A girl throws the paper plane **over** a fence.”

4.3.3.5 Pattern 5: Vertical + Deictic

Three predicates have *xia* (“go-down”) and a deictic morpheme. Again, once we look at the prompts they correspond to, it becomes evident why the participants would use a vertical morpheme. The reason is our world knowledge about rivers and ponds, as already discussed in 4.3.3.3.

One interesting thing is that none of the predicates has an XP_{-Loc} in its PATH, even though the prompts show plenty of landmarks that could have been encoded. A recurring pattern seems to emerge from the data we have seen thus far: If a path has a horizontal, vertical, ingressive, or egressive morpheme merged with a Dei-P, then there is no XP_{-Loc}.²⁴

(144)

Utterances in which pattern 5 is found	What event does the prompt depict?	Is there an XP _{-Loc} ?
0301MANCT	A boat floating down a river	No
0511MANSD	A boy pushing a girl into a pond	

(145) [Ver-P **xia** [Dei-P **lai** / **qu**]]

- (146) yi sao chuan cong he de shang fang huaxing **xia** **lai**.
 one CL boat from river GEN top side paddle **go-down** **come**
 [0302MANCT]

“A boat floats down from the upstream stretch of the river.”

²⁴ The reader can go back to the following sections to verify this observation: 4.3.1.3, 4.3.1.4, 4.3.2.4, 4.3.2.5, and 4.3.3.1.

4.3.3.6 Pattern 6: Ingressive / Egressive + Deictic

There are six predicates that have an ingressive or egressive morpheme along with a deictic. As the table below shows, none of them has an XP-_{Loc} in the PATH component, which confirms the observation we made in the last section: When a motion morpheme merges with a Dei-P—as illustrated in (148)—, that morpheme is prevented from merging with an XP-_{Loc}.

Why did the participant use *jin* (“enter”) and *chu* (“exit”) to describe the prompts? The reason for using the ingressive morpheme is fairly obvious: Toward the end of prompt 0602, a goose enters a brown container. It is also not difficult to see why the egressive morpheme is used for the prompts from series 1. In each of those prompts, a bird can be seen leaving a girl’s hands, and the space between her hands can be conceived as some kind of enclosure. However, the use of *chu* for prompt 0801 seems interesting (see Figure 4.7 and sentence (149)), for there is no visible enclosure of any kind. One possible explanation is that the participant may have imagined an invisible barrier surrounding the kite. At the beginning of the prompt, the kite is staying still as if some invisible barrier kept it from moving. Then it breaks “out of” the barrier around it and starts moving away. The fact that we rarely see a kite staying still in midair in the real world may have led the participant to (unconsciously) imagine the existence of such a barrier.

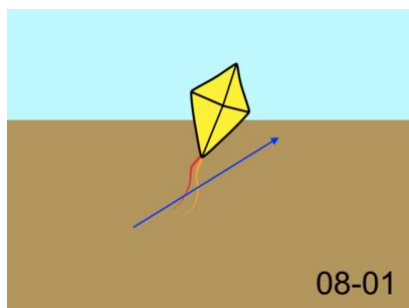


Figure 4.7: Prompt 08-01

(147)

Utterances in which pattern 6 is found	What morphemes are used?	Is there an XP- _{Loc} in path?
0115MANCT	Chu lai (“exit come”)	No
0117MANCT	Chu qu (“exit go”)	
0118MANCT	Chu qu (“exit go”)	
0139MANCT	Chu lai (“exit come”)	
0602MANCT	Jin qu (“enter go”)	
0801MANCT	Chu qu (“exit go”)	

(148) [Ing-P / Egr-P **jin** / **chu** [Dei-P **lai** / **qu**]]

- (149) yi ge fengzheng fei **chu** **qu** le.
 One CL kite fly **exit** **go** PFV [0801MANCT]
 “A kite has flown out and away.”

4.3.3.7 Pattern 7: Ingressive + XP-Loc

Fifteen predicates have an ingressive morpheme—*jin* or *ru*—and an XP-Loc complement in their PATH components. The structure of this pattern has already been illustrated twice in previous sections and need not be repeated here. Also, the reader should not be surprised by now to see the presence of an XP-Loc in the absence of a Dei-P. This is in sharp contrast with the last pattern we saw, in which an XP-Loc is absent in the presence of a Dei-P.

However, the reader may be surprised to learn that not all of the prompts these predicates correspond to are telic. Why is it so? A quick look at the example below may shed some light. Although prompt 0506 is labeled as atelic because it ends before the girl reaches the bottom of the pond, we can clearly see one of her feet is already submerged in water before the prompt ends. Moreover, if a figure can be considered to be inside a pond when she is inside its perimeter, then the girl certainly qualifies. Thus, utterances such as (150) need not be treated as errors or evidence against analyzing ingressive motion events as telic. They merely show that the subtleties of our conceptualizations of space and motion sometimes cannot be fully captured by these prompts.

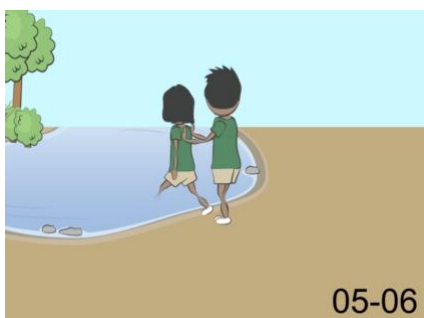


Figure 4.8: Prompt 05-06

- (150) hou fang xiaohai jiang qian fang xiaohai tui **ru** shui zhong.
 back side child JIANG front side child push **enter** water middle
 [0506MANZM]

“The child behind pushed the child in front of him into the water.”

4.3.3.8 Pattern 8: *Dao* or *Zhi* (“arrive”) + XP-_{Loc}

Seventeen predicates have a morpheme of arriving and an XP-_{Loc} complement that denotes a goal reached by a figure. In one predicate, 0304MANS_D, the morpheme of arriving is *zhi*; in the other 16, it is *dao*. The data are summarized below:

(151)

Utterances in which pattern 8 is found	How is the XP- _{Loc} interpreted?	Are the corresponding prompts labeled as telic or atelic?
0117MANS _D , 0118MANS _D , 0141MANS _D , 0214MANS _D , 0302MANS _D , 0304MANS _D , 0402MANS _D , 0510MANCT, 0602MANS _D , 0604MANS _D , 0613MANS _D , 0802MANCT, 1002MANS _D , 1005MANS _D	The goal reached the figure	telic
0505MANS _D , 0506MANS _D , 0506MANCT		atelic

(152) [_{End-P} **dao** / **zhi** [XP-_{Loc}]] → arriving at a goal

(153) yi zhi e ziji zou **dao** chongwulan nei
 one CL goose self walk **arrive** pet-pen inside [0604MANS_D]
 “A goose walked into the pet pen on its own.”

Again, the fact that three of these predicates correspond to atelic prompts does not necessarily mean *dao* and *zhi* play no role in the telicity of motion predicates. As already noted in the last section, some prompts—especially those from series 5 in which a girl is partially in the water but has not fully reached the bottom of a pond—can be easily perceived as telic even though they are not labeled as such. Furthermore, the XP-_{Loc}’s in these three predicates all refer to the *inside* of the pond rather than the bottom of it as a goal. Thus, as soon as the girl is considered to be inside the pond, she has already “arrived” at the goal.

4.3.3.9 Pattern 9: (Post-Manner-V) Directional Phrases

Thirteen predicates have directional phrases. Their syntactic structure and semantic properties have already been discussed in previous sections and will not be repeated here.

- (154) yi zhi e zou **xiang** zuo hou fang de chongwulan.
 one CL goose walk **toward** left back side DE pet-pen [0618MANSD]
 “A goose walks toward the pet pen on the left and in the back.”

4.3.3.10 Pattern 10: (Pre-Manner-V) Orientational Phrases

In this set of data, we found 34 predicates that only have an orientational phrase and a Manner-V. Since this pattern has already been examined in detail earlier, I will only provide an example here:

- (155) zai shulin shang mian de yi zhi niao **wang** xia feixing.
 Be-at woods top face DE one CL bird **toward** below fly [0127MANCT]
 “A bird on top of the forest flies down.”

4.3.3.11 Pattern 11: V + be-at + XP-Loc

We found four predicates with the pattern in (157), all corresponding to telic prompts. However, if we look closely at the data, it becomes clear that these are not motion predicates. The verbs *ting* (“stop”) and *zhan* (“stand”) can hardly be called manner verbs in these instances, as they describe the resulting states in which the figures end up. See below for an example:

(156)

Utterances in which pattern 11 is found	What verbs are used?
0117MANCT	Zhan (“stand”)
0117MANZM	Ting (“stop”)
0141MANCT	Zhan (“stand”)
0141MANZM	Ting (“stop”)

(157) [VP V [Zai-P **zai** [XP-Loc]]]

- (158) yuan chu de xiaohai jiang xiaoniao yefang
 Far place DE child JIANG little-bird release

rang ta ting zai jin chu de zhalan shang.

let 3rd stop **be-at** near place DE fence top [0141MANZM]

“The child in the distance releases the birdie, and lets it stop on top of the nearby fence.”

4.3.3.12 Pattern 12: Manner-V

There are three predicates that have a manner verb without a PATH. Below is an example:

(159) e likai-le.

goose leave-PFV

[0601MANZM]

“The goose has left.”

4.3.4 Two-Dimensional Path—Vertical and Horizontal

Let us now turn our attention to another set of prompts and the nine syntactic patterns they elicited. This set of prompts depict changes of positions in the vertical and horizontal dimensions. A total of 30 predicates were gathered.

Before we start the discussion on each of the patterns, two interesting things should be pointed out. First, the three types of prompts we saw earlier (i.e., horizontal-only, vertical-only, and horizontal-deictic prompts) all seem to have syntactic patterns that match the dimension(s) of the paths they depict. For example, the vertical-only prompts elicited a number of predicates that only have morphemes for vertical motion in their PATHs (recall sections 4.3.2.1 and 4.3.2.3, for instance); the horizontal-deictic prompts elicited several predicates with *guo lai* (“cross come”) or *guo qu* (“cross go”) (see section 4.3.3.1), and so on. But it is not the case with the set of prompts we will be looking at in this section: Of the nine patterns listed below, we do not see any that has vertical and horizontal morphemes in the same predicate. As will be clear later, it is one of the constraints Mandarin motion predicates have on PATH. Second, in the table below we do not see any patterns consisting of a horizontal or a vertical morpheme *alone*. When either of them appears, it is with a deictic morpheme (see patterns 3 and 4). It is quite intriguing in that the prompts we are looking at now depict changes of positions in the horizontal and vertical dimensions, but not in the deictic dimension. Why did the participants “add” a dimension so consistently? I shall return to this question later.

I will now discuss these nine patterns in the following sub-sections. Since all of them have been discussed in previous sections, I will only provide an example for each and briefly recapitulate some important observations.

(160) Patterns found in the utterances for prompts with the vertical and horizontal dimensions:

	Syntactic pattern	Utterances in which the predicates that have the syntactic pattern are found	Total number of predicates that have the syntactic pattern
1	Deictic	0206MANSD	1
2	Horizontal + Deictic	1015MANSD, 1015MANCT	2
3	Vertical + Deictic	0703MANSD, 0703MANCT, 0703MANZM, 1011MANSD, 1011MANCT, 1014MANSD, 1014MANCT, 1015MANCT, 1102MANSD, 1103MANCT-1, 1103MANCT-3, 1103MANZM	12
4	Egressive + Deictic	0205MANSD, 0205MANCT, 0206MANCT	3
5	Ingressive + XP- _{Loc}	1011MANZM	1
6	<i>Dao</i> (“arrive”) + XP- _{Loc}	1103MANSD	1
7	<i>Shang</i> (“get-onto”)	1102MANCT, 1102MANZM, 1103MANCT	3
8	(Pre-Manner-V) orientational phrases	0205MANZM, 0206MANZM, 1014MANZM, 1015MANZM	4
9	Manner-V + be-at + XP- _{Loc}	1103MANCT-1, 1103MANCT-3, 1103MANZM	3
	Total		30

4.3.4.1 Pattern 1: Deictic

The underlined portion in (161) is the only predicate in this data set that has a deictic morpheme as the sole element in its PATH. Again, it is no surprise that a Dei-P can be found in this set of data because, as mentioned before, the participant may have used something other than herself as the deictic center when producing the utterance.

(161) nūhai zhan zai zhuozi shang jiang yi ge zhifeiji
 girl stand be-at table top JIANG one CL paper-plane

wang xia fang she qu.
 toward below side shoot go

[0206MANSD]

“The girl is standing on the table. She throws a paper airplane downward.”

4.3.4.2 Pattern 2: Horizontal + Deictic

Two predicates have the morpheme *guo* (“cross”) and a deictic in their PATHS. These two happen to correspond to the same prompt, but one has the morpheme *qu* (“go”) while the other has *lai* (“come”). This shows that speakers have the ability to take different points of view and treat them as deictic centers when describing a motion event. Also, the two predicates do not have an XP-_{Loc} in their PATHS. Its absence is consistent with what we observed in previous sections.

(162) yi ke qiu cong yi ge tudui shang gun xia lai,
One CL ball from one CL mound top roll go-down come

wang qian fang de muzhalan fei guo lai.
toward front side DE wood-fence fly **cross come** [1015MANCT]
“A ball rolls down from the top of a mound (and) flies *over* toward the wooden fence in front of it.”

4.3.4.3 Pattern 3: Vertical + Deictic

We found 12 predicates with a vertical and a deictic morpheme, one of which has already been shown in the first line of utterance (162) (i.e., the part without an underline). Again, we found no XP-_{Loc} in any of the predicates’ PATH components.

4.3.4.4 Pattern 4: Egressive + Deictic

Three predicates have the egressive *chu* (“exit”) and a deictic morpheme. All of them correspond to prompts from series 2 depicting a girl throwing out a paper plane.

(163) yi ge nüsheng jiang zhifeiji wang shang she-le chu qu.
One CL girl JIANG paper-plane toward top shoot-PFV **exit go**
[0205MANSD]

“A girl threw the paper airplane upward.”

4.3.4.5 Pattern 5: Ingressive + XP-Loc

Sentence (164) below is the only instance in this data set that has a PATH with an ingressive morpheme and an XP-Loc complement.

- (164) you yi ge qiu cong tuqiu gao chu gun **ru-le**
Have one CL ball from mound high place roll **enter-PFV**

tuqiu xia mian de banyuanxing kengdong zhong.
mound below face DE semi-circular pit middle [1011MANZM]

“There was a ball rolling from the top of the mound **into** a semi-circular pit below the mound.”

4.3.4.6 Pattern 6: *Dao* (“arrive”) + XP-Loc

There is only one predicate with the morpheme *dao* (“arrive”) in this set of data. It takes an XP-Loc that refers to the goal reached by the figure. This predicate corresponds to a telic prompt.

- (165) yi ge daren jiang yi ge xiaohai bao **dao** yi ge muzhuo shang.
One CL adult JIANG one CL child hug **arrive** one CL wood-table top
[1103MANSND]

“An adult holds a child and puts him on a wooden table.”

4.3.4.7 Pattern 7: *Shang* (“get-onto”)

Three predicates have the morpheme *shang*, and two of them also have an XP-Loc that denotes the surface or object on top of which a figure ends up. In section 4.3.2.7 I mentioned that *shang* in predicates like these seems to mean “move onto something” rather than upward motion. With this syntactic pattern, a motion predicate is interpreted as such that there is some object in the event for the figure to move onto, and that the figure is not moving up in an empty space. Even though one of the predicates lacks an XP-Loc (perhaps because *shang* is used in a somewhat idiomatic expression in that utterance), it still has an interpretation that the figure is moving onto something.

(166)

Utterances in which pattern 7 is found	What surface does the figure move onto in the prompt?	Does <i>shang</i> take an XP _{-Loc} complement?	What does the XP _{-Loc} refer to?
1102MANCT	Top of the table	Yes	Top of the table
1102MANZM	Top of the table	No	N/A
1103MANCT	Top of the table	Yes	The table

- (167) *daren ba xiaohai cong di shang bao shang zhuo.*
 adult BA child from ground top hug **get-onto** *table* [1103MANCT]
 “The adult picks up the child from the floor and puts him on the table.”

4.3.4.8 Pattern 8: (Pre-Manner-V) Orientational Phrases

Four predicates have an orientational phrase. One example is given below:

- (168) *xiaohai jiang zhifeiji wang qian fang toushe.*
 Child JIANG paper-plane **toward** *front direction* shoot [0205MANZM]
 “The child *throws* the paper plane *toward* the area in front of her.”

4.3.4.9 Pattern 9: Manner-V + be-at + XP_{-Loc}

Three predicates have a manner verb and a *zai* (“be-at”) phrase. In every one of them, the manner verb is *zuo* (“sit”), and the morpheme *zai* takes an XP_{-Loc} that refers to the location where the figure sits.

- (169) *baba ba zuo zai di shang de xiaohai bao qi lai*
 Father BA sit be-at ground top DE child hug rise come

rang ta zuo zai yizi shang.
 let 3rd sit **be-at** *chair top* [1103MANZM]
 “The father picked up the child that was sitting on the floor and let him sit on the bench.”

4.3.5 Three-Dimensional Path

Finally, we are going to look at prompts that depict changes of positions in all three dimensions and the data they elicited. Just as with vertical-horizontal prompts, we find an intriguing absence of syntactic patterns that match the three-dimensional prompts. That is, there are no patterns in table (170) that have horizontal, vertical, and deictic morphemes all in one single predicate (let alone one single PATH). Moreover, there are no predicates that have both vertical and horizontal morphemes, either. Given that a total of 188 predicates were gathered and analyzed for this section, this absence is unlikely due to chance.

Equally interesting is the absence of patterns that consist of a horizontal or vertical morpheme *alone*—an absence we already noticed in section 4.3.4. In the table below, we see a pattern consisting of a single deictic morpheme (pattern 3), but when a horizontal or vertical morpheme appears, it is always accompanied by either a deictic morpheme or an XP_{-Loc}. Now, looking back at all the patterns we’ve examined so far, we can only find ten instances where a vertical morpheme is used without a Dei-P or an XP_{-Loc}: Two elicited by horizontal-deictic prompts (see section 4.3.3.3), the other eight by vertical-only prompts (see sections 4.3.2.1 and 4.3.2.2). We find zero instances where a horizontal morpheme appears by itself. In contrast, the total number of instances where a deictic morpheme appears alone is 16, despite the fact that we do not even have prompts depicting motion *solely* in the deictic dimension.

Before exploring the reasons behind these interesting observations any further, I shall go through the following patterns first. Again, unless there is new information, I will not spend too much time on the observations and generalizations we already made in earlier sections.

(170) Patterns found in the utterances for prompts with all three dimensions:

	Syntactic pattern	Utterances in which the predicates that have the syntactic pattern are found	Total number of predicates that have the syntactic pattern
1	Vertical +XP _{-Loc}	0605MANCT, 0606MANCT, 0614MANCT, 0615MANCT, 0616MANCT, 0902MANCT, 0902MANZM, 0904MANCT, 1301MANS	9
2	Horizontal + XP _{-Loc}	0109MANCT, 0110MANCT, 0111MANCT, 0112MANCT, 0119MANCT, 0121MANCT, 0122MANCT, 0123MANCT, 0124MANCT, 0126MANCT	10
3	Deictic	0106MANZM, 0107MANZM, 0110MANZM, 0121MANZM, 1006MANZM	5

4	Horizontal + Deictic	0106MANSD, 0106MANCT, 0107MANSD, 0107MANCT, 0110MANCT, 0119MANCT, 0121MANCT, 0207MANZM, 0208MANSD, 0605MANSD, 0706MANSD, 0901MANSD, 1006MANSD, 1301MANZM	14
5	Vertical + Deictic	0215MANCT, 0508MANSD, 0608MANZM, 0701MANSD, 0701MANCT, 0701MANZM, 0702MANSD, 0702MANCT, 0702MANZM, 0704MANSD, 0704MANCT, 0704MANZM, 0705MANSD, 0705MANCT, 0706MANCT, 0707MANCT, 0707MANZM, 0901MANCT, 1305MANSD, 1305MANCT, 1305MANZM	21
6	Egressive + Deictic	0125MANCT, 0207MANSD, 0215MANSD	3
7	Ingressive/Egressive	0208MANCT, 0209MANCT, 0209MANZM, 0210MANCT, 0210MANZM, 0217MANCT, 0507MANCT, 0507MANZM, 0508MANZM, 0512MANCT, 0512MANZM, 0513MANCT, 0513MANZM, 0617MANCT, 0617MANZM, 0901MANCT, 0901MANZM, 0903MANZM, 0904MANCT, 0904MANZM, 0905MANCT, 0905MANZM, 0906MANCT, 0906MANZM, 0908MANCT, 0908MANZM, 1006MANCT, 1007MANCT, 1007MANZM, 1008MANCT, 1009MANCT, 1009MANZM	32
8	<i>Dao</i> (“arrive”) + XP-Loc	0104MANSD, 0104MANZM, 0105MANSD, 0105MANCT, 0105MANZM, 0111MANSD, 0111MANZM, 0112MANSD, 0120MANCT, 0120MANZM, 0122MANSD, 0122MANZM, 0124MANSD, 0126MANSD, 0209MANSD, 0210MANSD, 0216MANCT, 0217MANSD, 0218MANCT, 0508MANCT, 0512MANSD, 0513MANSD, 0606MANSD, 0608MANSD, 0615MANSD, 0617MANSD, 0705MANZM, 0707MANSD, 1007MANSD, 1009MANSD	30
9	<i>Shang</i> (“get-onto”) + XP-Loc	0606MANZM, 0608MANCT, 0903MANCT, 0904MANSD	4
10	(Post-Manner-V) directional phrases	0103MANSD, 0103MANCT, 0104MANCT, 0109MANSD, 0110MANSD, 0112MANZM, 0119MANZM, 0120MANSD, 0216MANSD, 0507MANSD, 0607MANSD, 0614MANSD, 0616MANSD, 0617MANZM, 0902MANSD, 0903MANSD, 0905MANSD, 0906MANSD, 0907MANSD, 0908MANSD, 1008MANSD	21
11	(Pre-Manner-V) orientational phrases	0103MANZM, 0109MANZM, 0119MANSD, 0120MANZM, 0121MANSD, 0123MANSD, 0123MANZM, 0125MANSD, 0125MANZM, 0207MANCT, 0208MANZM, 0210MANCT, 0210MANZM, 0215MANZM, 0216MANCT, 0216MANZM, 0217MANZM, 0218MANZM, 0605MANCT, 0605MANZM, 0607MANCT, 0607MANZM, 0614MANZM, 0615MANZM, 0616MANZM, 0706MANZM, 0905MANSD, 0907MANCT, 0907MANZM, 0908MANSD, 1008MANZM, 1009MANZM	32
12	V + be-at + XP-Loc	0124MANCT, 0124MANZM, 0126MANCT, 0126MANZM, 0218MANSD, 0218MANZM	6
13	Manner-V only	1301MANCT	1
	Total		188

4.3.5.1 Pattern 1: Vertical + XP-Loc

The nine predicates listed in table (171) below have a syntactic pattern that has not been discussed so far: a vertical morpheme, either *shang* (“go-up”) or *xia* (“go-down”), taking an XP-Loc complement. What is interesting is how the XP-Loc is interpreted in this structure (see (172)). Take sentence (173), which corresponds to the atelic prompt 1301. The complement of *shang* in that sentence refers to the tree via which the figure ascends. Or take sentence (174), which corresponds to the atelic prompt 0616. The XP-Loc there refers to the hill, via which the boy is descending.²⁵

(171)

Utterances in which pattern 1 is found	What vertical morpheme is used?	How is the XP-Loc complement interpreted?
0605MANCT	<i>Shang</i> (“go-up”)	Object via which the figure ascends
0606MANCT		
0614MANCT		
0615MANCT		
0616MANCT	<i>Xia</i> (“go-down”)	Object via which the figure descends
0902MANCT		
0902MANZM		
0904MANCT	<i>Shang</i> (“go-up”)	Object via which the figure ascends
1301MANS D		

(172) [Ver-P **shang** [XP-Loc]] → ascending via something

[Ver-P **xia** [XP-Loc]] → descending via something

²⁵ Now, here comes an interesting question: In previous sections we looked at the morpheme *shang* that means “to get onto something.” Here, there seems to be another *shang* with the meaning “to move up via something.” Are they really two different morphemes with different interpretations? I suppose one may argue they are actually the same. The argument may go like this: *Shang* only has one reading, and it is “to move onto something.” The reason why sentences like (173) appear to have an “ascend via” reading is that our sense about whether a figure is *on* something or not is sometimes very fuzzy. Take prompt 1301 for instance. When is the girl considered to be *on* the tilted tree? Is it when her whole body first comes into contact with the bottom of the trunk? Or is it when she reaches the top of the trunk? If it is the former, why can’t we assign a “get onto” reading to the *shang* in (173)? And even if it is the latter, one can still claim that the girl is in the process of “getting onto” the top of the trunk. I think this may well be true. However, without prompts specifically designed to test this possibility, I am taking a more conservative approach and treating these two instances of *shang* as separate morphemes.

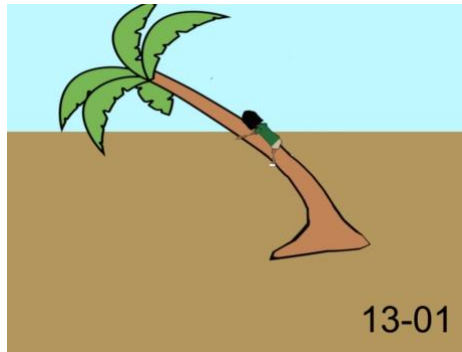


Figure 4.9: Prompt 13-01

- (173) yi ge nüsheng pa **shang** yi ge qingxie de shu.
 One CL girl climb **go-up** one CL tilted DE tree [1301MANSD]
 “A girl climbs **up** a tilted tree.”

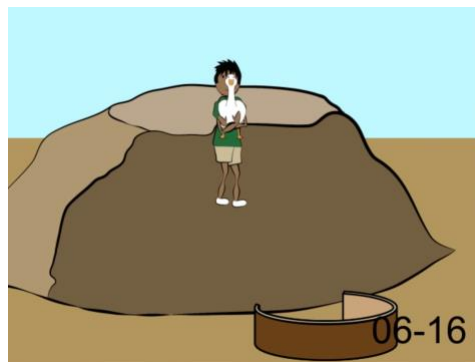


Figure 4.10: Prompt 06-16

- (174) yi ge nanhaizi bao-zhe yi zhi e zou **xia** shanpo
 One CL boy hug-IMP one CL goose walk **go-down** hill

 chao-zhe yi ge banyuexing de weili.
 face-IMP one CL crescent DE fence [0616MANCT]
 “A boy walks **down** the hill while holding a goose and is facing a crescent fence.”

4.3.5.2 Pattern 2: Horizontal + XP-Loc

The following ten predicates have the morpheme *guo* (“cross”) and an XP-Loc complement. Again, the data below show that this syntactic pattern specifically yields a boundary-crossing reading rather than horizontal motion, as all the prompts we have seen this pattern correspond to have a clearly discernible boundary crossed by a figure.

(175)

Utterances in which pattern 2 is found	Is there a boundary in the prompt? If so, what is it?	Does <i>guo</i> take an XP-Loc complement? If so, what does it refer to?
0109MANCT	Yes, a river	Yes, the river
0110MANCT	Yes, a river	Yes, the riverside
0111MANCT	Yes, a river	Yes, the river
0112MANCT	Yes, a river	Yes, the river
0119MANCT	Yes, a river	Yes, the river
0121MANCT	Yes, a river	Yes, the river
0122MANCT	Yes, a river	Yes, the riverside
0123MANCT	Yes, a river	Yes, the river
0124MANCT	Yes, a river	Yes, the river
0126MANCT	Yes, a river	Yes, the river

(176) yi zhi niao cong yi ke shu shang fei **guo** yi tiao he.

One CL bird from one CL tree top fly **cross** one CL river

[0109MANCT]

“A bird flies **across** a river from the top of a tree.”

4.3.5.3 Pattern 3: Deictic

Five predicates have a deictic morpheme in their PATHs. Below is one example:

(177) you yi ke qiu wang qiukuang fangxiang fei **lai**.

Have one CL ball toward goal side fly **come** [1006MANZM]

“There is a ball flying over in the direction of the hoop.”

4.3.5.4 Pattern 4: Horizontal + Deictic

The table below shows 14 predicates that have *guo* (“cross”) and a deictic morpheme. Not all the corresponding prompts have a boundary. In fact, the majority of them do not. Furthermore, none of the predicates have an XP-_{Loc} in their PATHs.

(178)

Utterances in which pattern 4 is found	Is there a boundary in the prompt? If so, what is it?	Does <i>guo</i> take an XP- _{Loc} complement?
0106MANS	No	No
0106MANCT	No	
0107MANS	No	
0107MANCT	No	
0110MANCT	Yes, a river	
0119MANCT	Yes, a river	
0121MANCT	Yes, a river	
0207MANZM	No	
0208MANS	No	
0605MANS	No	
0706MANS	No	
0901MANS	No	
1006MANS	No	
1301MANZM	No	

(179) you yi ge xiaohai na-zhe zhifeiji
Have one CL child hold-IMP paper-plane

chao-zhe wo diu **guo lai.**

toward-IMP 1st throw **cross come** [0207MANZM]

“There is a child holding a paper plane and throwing it over in my direction.”

4.3.5.5 Pattern 5: Vertical + Deictic

There are 21 predicates with the vertical morpheme *xia* (“go-down”) and a deictic morpheme. Consistent with our earlier observation, none of the predicates has an XP-_{Loc} in the PATH even though the majority of the corresponding prompts show an object via which a figure descends, e.g., a slide. Below is an example:

- (180) baba ba xiaohai cong liuhuati shang tui **xia lai**.
 Father BA child from slide (n.) top push **go-down come** [0704MANZM]
 “The father pushes the child **down** from the top of the slide.”

4.3.5.6 Pattern 6: Egressive + Deictic

Three predicates have the morpheme *chu* (“exit”) along with the deictic morpheme *qu* (“go”). The prompts they correspond to all show a figure leaving an agent’s hands, which can easily be perceived as an enclosure or barrier. None of the predicates has an XP-_{Loc} in the PATH.

- (181) yi ge nüsheng jiang zhifeiji
 One CL girl JIANG paper-plane

 wang shang fang she-le **chu qu**.
 toward top side shoot-PFV **exit go** [0207MANSD]
 “A girl threw the paper airplane upward.”

4.3.5.7 Pattern 7: Ingressive / Egressive

Thirty-two predicates have an ingressive or egressive morpheme without a Dei-P. An example is given in (182). Notice that even though *ru* does not take an XP-_{Loc} complement in this particular example, the presence of an ingressive space must still be part of the interpretation. In other words, there must exist a space or area for the figure to enter.²⁶

²⁶ This point is not trivial. Recall that every path must be anchored in space somehow. How is a PATH that doesn’t have a referential XP-_{Loc} anchored in Mandarin, then? The answer is that certain motion morphemes, such as *ru* (“enter”), can only be interpreted by presupposing the existence of some landmark in space. An event of entering, for example, cannot take place without the existence of an area that can be entered. A comparison between the following sentences can illustrate this point:

- i) Qian fang you ge suidao. Women jijiang kai ru.
 Front side have CL tunnel 1st-PL soon drive enter
 “There is a tunnel ahead. We will drive in soon.”
- ii) ??Women shi suidao gongren. Women jijiang kai ru.
 1st-PL be tunnel worker 1st-PL soon drive enter
 ??“We are tunnel construction workers. We will drive in soon.”

Another point worth mentioning here is that none of the 32 predicates has a vertical or horizontal morpheme in its PATH. In fact, in the data we have looked at so far, there are no patterns consisting of an ingressive or egressive along with a horizontal or vertical. The absence of this logically possible combination is quite peculiar, especially since the participants did notice changes of positions in the vertical and horizontal dimensions in the prompts. Take (182) for instance. The participant clearly noticed there is a height difference between the toy vehicle's initial position and the tunnel's position, indicated by her use of *di chu* ("low place") and *gao chu* ("high place"). But why did she not encode that by using *shang* ("go-up") in the PATH? That is, why did she not say *shi shang ru* ("drive go-up enter")? This is another constraint of PATH in Mandarin we will explore later.

(182) you yi ge wanjuche cong di chu
have one CL toy-vehicle from low place

wang xiaoqiu gao chu de suidao nei daotui shi **ru**.
toward small-hill high place DE tunnel inside back-up drive **enter**
[0903MANZM]

"There is a toy vehicle backing up from the bottom into a tunnel on the small hill."

4.3.5.8 Pattern 8: *Dao* ("arrive") + XP-_{Loc}

Thirty predicates have the morpheme *dao* along with an XP-_{Loc} complement. Except for two predicates found in 0216MANCT and 0508MANCT, all of them correspond to telic prompts. When interviewing the participant who produced the two predicates that correspond to atelic prompts, I pointed out that the figures in those prompts do not actually reach the goals. The participant agreed that her use of *dao* was based on how she thought the events would unfold, rather than what was actually shown. An example is below:

Now, notice that the contrast here is not about whether or not we know what we will be driving into. The word *suidao* ("tunnel") makes it fairly clear that whatever we will be entering is called a tunnel. The real difference is this: While *suidao* in sentence (i) is embedded in an existential construction (i.e., the *you NP* ("there exists NP") construction), *suidao* in sentence (ii) is not. Sentence (ii) is awkward because even though we know driving into tunnels is something that tunnel construction workers typically do, we do not know of any specific tunnel from the context. Therefore, the only way to interpret (ii) in a pragmatically natural fashion is to think of *suidao gongren* as a construction crew working on a specific tunnel that they are about to drive into.

- (183) yi ge fenhongse de qiu ziji fei **dao** lankuang li.
 One CL pink DE ball self fly **arrive** hoop inside [1007MANSD]
 “A pink ball flies **into** *the basket* on its own.”

4.3.5.9 Pattern 9: *Shang* (“get-onto”) + XP-_{Loc}

There are four predicates that have the morpheme *shang* (“get-onto”) and an XP-_{Loc} complement. The most interesting one is in (184), which corresponds to prompt 0608 (see Figure 4.11). Notice that throughout the entire event, there is not a single moment in which the goose is moving upward. Yet, the participant used the morpheme *shang*. This means that *shang* in this instance does not yield a reading of upward motion. Rather, it must be interpreted as “move onto something.”

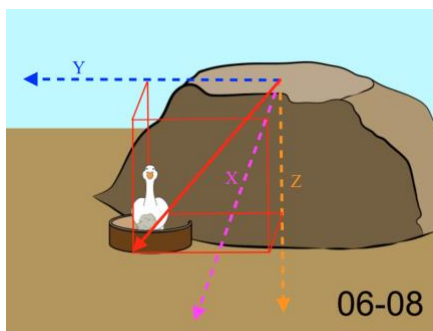


Figure 4.11: Prompt 06-08

- (184) Yi ge datudui shang mian you yi zhi e,
 one CL big-mound top face have one CL goose

 e jiu wang xia zou **shang** yi ge yuanpen li tou.²⁷
 goose then toward below walk **get-onto** one CL round-basin inside head
 [0608MANCT]

“There is a goose on a hill. The goose walks downward and onto a round basin.”

²⁷ Some readers may find this sentence somewhat unusual due to the co-occurrence of *shang* (“get-onto”) and the localizer phrase *li tou* (“inside”) at the end. However, it is not difficult to see what the participant was trying to express: By *li tou*, she was referring to the physical, tangible part of the container that is enclosed by its sides. In other words, she was talking about the physical bottom of the container rather than the empty space in it. Since the goose moves *onto* that physical bottom, the sentence is felicitous.

4.3.5.10 Pattern 10: (Post-Manner-V) Directional Phrases

Twenty-one predicates have post-Manner-V directional phrases. They are listed in the table below. Here, we are seeing some familiar patterns that we have seen before. First, even though the prompts show three-dimensional paths, none of the 21 predicates have any of the motion morphemes for the three dimensions. Second, a number of predicates here correspond to prompts depicting ingressive events (e.g., prompts from series 9), but none of those predicates have an ingressive morpheme. Finally, the XP_{-Loc} complement of the directional head in each predicate is referential²⁸. All these are consistent with our earlier observations and suggest that a directional phrase may constitute a PATH by itself.

(185)

Utterances in which pattern 10 is found	Does the predicate have any of the 3D morphemes: <i>guo</i> (“cross”), <i>shang</i> (“go-up”), <i>xia</i> (“go-down”), <i>lai</i> (“come”), or <i>qu</i> (“go”)?	Does the predicate have an ingressive or egressive: <i>jin</i> (“enter”), <i>ru</i> (“enter”), or <i>chu</i> (“exit”)?	Is the XP _{-Loc} complement a referential expression?
0103MANSD	No	No	Yes
0103MANCT	No	No	Yes
0104MANCT	No	No	Yes
0109MANSD	No	No	Yes
0110MANSD	No	No	Yes
0112MANZM	No	No	Yes
0119MANZM	No	No	Yes
0120MANSD	No	No	Yes
0216MANSD	No	No	Yes
0507MANSD	No	No	Yes
0607MANSD	No	No	Yes
0614MANSD	No	No	Yes
0616MANSD	No	No	Yes
0617MANZM	No	No	Yes
0902MANSD	No	No	Yes
0903MANSD	No	No	Yes
0905MANSD	No	No	Yes
0906MANSD	No	No	Yes
0907MANSD	No	No	Yes

²⁸ In many cases, such as (186), an XP_{-Loc} is just a DP that refers to some object shown in the prompt. (The term XP_{-Loc} is kind of a misnomer in those cases, but remember that an object has a certain location in space.) Referentiality can be verified very easily in those instances. However, sometimes things are not so straightforward and may require a test. To determine whether an XP_{-Loc} can refer to a location that exists, I use it in an existential construction such as (i) below. If the result is acceptable, then the XP_{-Loc} is referential in the sense I have been using for our discussion. For example, *qian mian* (“front face”) would work in this construction, but *qian* (“front”) would not.

- i) _____ you yi zhi niao. ii) qian *(mian) you yi zhi niao.
 _____ have one CL bird front *(face) have one CL bird
 “_____ is a bird.” “In the area ahead is a bird.”

0908MANSD	No	No	Yes
1008MANSD	No	No	Yes

(186) yi ge nansheng jiang yi ge fenhongse de qiu diu **xiang** lankuang
 One CL boy JIANG one CL pink DE ball throw **toward** hoop

[1008MANSD]

“A boy throws a pink ball toward the basket.”

4.3.5.11 Pattern 11: (Pre-Manner-V) Orientational Phrases

Thirty-two predicates have pre-Manner-V orientational phrases. As already demonstrated before, orientational and directional phrases have very different properties. To recap, the presence of an orientational phrase does not preclude the presence of motion morphemes such as *guo* (“cross”), *shang* (“go-up”), and *qu* (“go”) in PATH. Also, the head of an orientational phrase can merge with an XP_{-Loc} that is not referential, such as *qian* (“front”). The reader can refer back to sections 4.3.1.8 and 4.3.1.9 for details and examples.

One of the 32 predicates is worth showing here. In (187), the orientational phrase *xiang xia* is in bold. What is interesting is that in the same predicate there is also a directional phrase, which is underlined. The complements in the phrases are *xia* (“below”) and *zuo bian de yi ge shandong* (“a tunnel on the left”) respectively, which are obviously different spatial concepts. This suggests that orientational and directional phrases are really different syntactic components with different functions. They are not one phrase that can merge with a Manner-V either to its right or to its left.

(187) yi ge nühai jiang yi ge wanjuche cong you bian de shanpo
 One CL girl JIANG one CL toy-vehicle from right side DE hill

xiang **xia** tui wang zuo bian de yi ge shandong.
facing **below** push toward left side DE one CL tunnel

[0905MANSD]

“Aiming it downward, a girl pushes a toy vehicle from the hill on the right toward a tunnel on the left.”

4.3.5.12 Pattern 12: V + be-at + XP-Loc

Six predicates have a verb and a *zai* (“be-at”) phrase. From the list below, we can see that except in 0218MANSD, the verbs are not motion verbs. Although they correspond to telic motion events, those five predicates describe only the final locations at which the figures end up. The one verb that can be analyzed as a Manner-V is *she* (“shoot”), and the predicate in which it appears is given as an example below.

(188)

Utterances in which pattern 12 is found	What verbs are used?
0124MANCT	Ting (“stop”)
0124MANZM	Ting (“stop”)
0126MANCT	Zhanli (“stand”)
0126MANZM	Ting (“stop”)
0218MANSD	She (“shoot”)
0218MANZM	Ting (“stop”)

(189) yi ge nǚsheng jiang yi ge zhifeiji
One CL girl JIANG one CL paper-plane

she **zai** shanpo shang de guanmucong shang.
shoot **be-at** hill top DE bush top

[0218MANSD]

“A girl throws a paper plane onto the bush on the hill.”

4.3.5.13 Pattern 13: Manner-V

Finally, there is one predicate that has a Manner-V with no PATH. That predicate is in (190) below. Again, we know there is no PATH because the motion of the girl is not necessarily translational. The sentence below can be interpreted as such that the girl is crawling back and forth on the tilted tree.

(190) yi ge nǚhaizi zai yi ke qingxie de shu shang **paxing**.
One CL girl be-at one CL tilted DE tree top **crawl**

[1301MANCT]

“A girl is crawling on a tilted tree.”

4.3.6 Systematization of the Patterns Across Dimensions

In this section I will summarize some important observations we made in the previous sections. First, it appears that a motion morpheme (such as *guo* (“cross”) and *shang* (“go-up”)) can merge with either a Dei-P (see (191) and (192)) or an XP-Loc (see (193) and (194)), but not at the same time (see (195) and (196)).

(191) [**guo** (“cross”) / **shang** (“go-up”) / **xia** (“go down”) [Dei-P]]

(192) yi zhi e zou-le **guo lai**.
 one CL goose walk-PFV **cross come** [0603MANSD]
 “A goose walked over here.”

(193) [**guo** (“cross”) / **shang** (“go-up”) / **xia** (“go down”) [XP-Loc]]

(194) you yi ge xiaohai jiang zhifeiji she **guo-le** zhalan.
 have one CL child JIANG paper-plane shoot **cross-PFV** fence [0211MANZM]
 “There is a child throwing a paper plane **over** the fence.”

(195) *[**guo** (“cross”) / **shang** (“go-up”) / **xia** (“go down”) [Dei-P] [XP-Loc]]

(196) *yi zhi e fei **guo lai** zhalan.
 one CL goose fly **cross come** fence
 *“(A) goose flies over here the fence.”

Second, the interpretations of [*guo* [Dei-P]] and [*guo* [XP-Loc]] are different. Recall that without exception, every instance of [*guo* [XP-Loc]] in the data corresponds to a prompt that shows a figure crossing a boundary, such as a river, a fence, etc²⁹, and the XP-Loc encodes precisely the

²⁹ Furthermore, I set up a scenario in which water inside a coffee maker drips through a filter and into a pot, with the filter serving as a boundary. I then asked the participants if sentence (i) below was acceptable in such a scenario, pointing out that water moves vertically, not horizontally, in a coffee maker. Their answers were positive. This means that it would be too simplistic to treat the morpheme *guo* as always yielding a reading of horizontal motion by itself.

boundary. In contrast, instances of [guo [Dei-P]] do not always correspond to prompts showing boundaries. They sometimes correspond to prompts that show nothing but a figure moving horizontally.³⁰ Sentence (192) is an example, which corresponds to prompt 06-03, shown below.

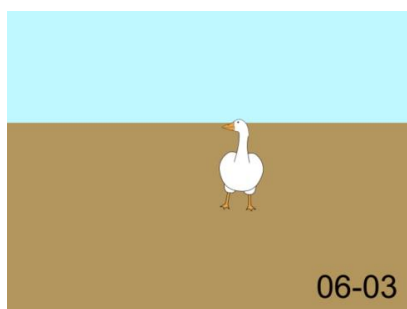


Figure 4.12: Prompt 06-03

Third, post-Manner-V directional (see (197)) and pre-Manner-V orientational phrases (see (198)) have different syntactic properties and interpretations, despite the fact that their heads can sometimes be phonologically identical. (As we’ve seen, they are often phonologically realized as *xiang* or *wang* in our data.) Directional phrases appear to denote bona fide motion events, whereas orientational phrases seem to denote orientations only.³¹ Thus, the latter are perfectly compatible with dispositional change events, while the former are not compatible with such events because they are not motion events by definition (see (199), which describes the dispositional change event of Figure 4.13). This difference is related to what kinds of complements they can take: A directional head cannot take an XP_{-Loc} complement that does not refer to a specific point or area in space, while an orientational phrase can (see (198)). Recall from section 4.2 that one implication

Given the right syntactic configuration, it can be used felicitously even for a vertical motion event of boundary crossing.

- i) shui di guo lüzhi.
 water drip cross filter
 “The water drips through the filter.”

³⁰ The observation that [guo [Dei-P]] does not always denote motion events involving a boundary has been made by other researchers. For example, see Wei (2013).

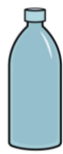
³¹ The fact that these two kinds of phrases are different has been independently observed by Lin (2019). Taking a cognitive functional approach, she reports that the orientational phrase is less likely to have a location NP than the directional phrase (pp. 184-188). (What I call orientational and directional phrases are termed *pre-verbal* and *post-verbal directional PP’s* by Lin.) Although her study was conducted within a very different theoretical framework, her observation is entirely consistent with my claim that these two kinds of phrases belong to different syntactic components.

of the Cartesian conceptualization of a path is that a vector (i.e., a path)—whose head and tail are represented as two sets of coordinates—must exist somewhere in the space constructed by the three axes. This need for spatial anchoring is also present in PATH, which is why directional phrases need referential XP-_{Loc}'s (see (200)).

- (197) feiji fei **xiang** yi ge shuitong.
 plane fly **toward** one CL bucket [0219MANCT]
 “The plane is flying **toward** a bucket.”

- (198) you ge xiaohai ba zhifeiji **wang** qian diu.
 have CL child BA paper-plane **toward** front throw [0203MANZM]
 “There is a child throwing the paper plane forward.”

- (199) yi ge pingzi (wang qian fang) dao (*wang qian fang).
 one CL bottle (toward below side) fall (toward front side)
 “A bottle falls headlong.”



12-01



12-01



12-01

Figure 4.13: Prompt 12-01

- (200) you ge xiaohai ba zhifeiji diu **wang** qian *(fang).
 have CL child BA paper-plane throw **toward** front *(side)
 “There is a child throwing the paper plane forward.”

Fourth, the ingressive and egressive morphemes never appear with vertical or horizontal morphemes. Also, vertical and horizontal morphemes never co-occur. In other words, a PATH can only have two motion morphemes at most, and one of them must be deictic.

Fifth, a deictic morpheme can occur by itself in a motion predicate, and there are plenty of data showing that. Yet, throughout the previous sub-sections we found zero instances of a horizontal morpheme appearing in a predicate without a Dei-P or XP_{-Loc}; we only found ten instances of a vertical morpheme appearing without a Dei-P or XP_{-Loc}. Upon closer inspection, six of these ten instances actually correspond to events of dispositional change rather than motion events (see sections 4.3.2.1 and 4.3.2.2 for those instances). Thus, the number of motion predicates in which a vertical morpheme appears by itself is actually four. Given that there are no prompts depicting motion only in the deictic dimension, but that there are prompts only for the vertical or horizontal dimension, this finding is quite unexpected.

The fourth and fifth observations are especially curious, and to the best of my knowledge, there has not been an explanatory account for them yet. Even more curious is the fact that not all languages share this set of constraints. For example, in Ghanaian Student Pidgin it is possible to have verbs for vertical, horizontal, and deictic motion in one single PATH (Osei-Tutu 2019). From now on, I will refer to this set of curious facts as *the Problem of PATH*, and it will be the primary focus of sections 4.5 and 4.6.

Lastly, there are some *preferential* patterns in the data showing that the participants preferred to use certain motion morphemes for certain prompts. The most interesting one has to do with prompts from series 15. The theme of this series is a wooden nail falling or being hammered into a cube. Except for two instances that have deictic morphemes, none of the predicates elicited by series 15 encodes any of the three dimensions. Instead, the participants almost exclusively used the ingressive to describe the prompts. It is clear from their utterances that they chose to focus on the ingressive aspect of the events, hence their preference for the use of *jin* and *ru* (“enter”). The same can be said, though to a lesser degree, about the prompts of a ball entering a basket or a goal. This may be because nails, hammers, baskets, and goals are all artifacts with very specific and salient functions, and those functions all involve ingressive motion.

The variety of syntactic patterns we have seen in this section shows that a motion event is multifaceted and can be conceptualized in many different ways. Speakers pay attention to only a subset of features in a scene and encode them in a way that conforms to the grammatical constraints of their language. We must, therefore, make a difference here between syntactic constraints that limit the availability of patterns and the choices speakers make from those available patterns. While the latter is an interesting topic in and of itself, this dissertation is focused on the former.

4.4 PATH and MANNER as Distinct Components

Recall from section 1.5 that PATH and MANNER are hypothesized to be two distinct components. In this section I will present evidence for this hypothesis.

From a conceptual perspective, it is quite intuitive that path and manner are distinct, as the former is a concept of translation motion while the latter is not. From the perspective of syntax, this appears to be true as well for two reasons. First, in section 2.3 I already argued that MANNER is lexical in nature while PATH is (semi-)functional. Second, the syntactic behavior of the outer aspect marker *-le*³² is sensitive to the distinction between these two components. The following will be focused on this second reason.

4.4.1 Evidence from the Syntax of the Outer Aspect Marker *-Le*

I follow Li and Thompson's (1981) treatment of *-le* as a perfective marker, and I adopt Soh's (2014) syntactic analysis that places *-le* above *vP* (if there is an Agent) and below *TP*. Using XSM terminology, the assumption here is that *-le* is a range assigner to [*Asp*<*e*>], which is sandwiched between *vP* (again, if there is an Agent) and *TP*. Notice that *AspP* is a functional projection for outer aspect—sometimes called viewpoint aspect in the literature—and should not be confused with *AspQP*, which is for inner aspect and will be discussed in the next chapter. Diagram (202) shows the structural position of *-le* based on the example in (201):

- (201) Ta she-le yi ge zhifeiji.
3rd shoot-PFV one CL paper-plane
“S/he threw out a paper plane.”

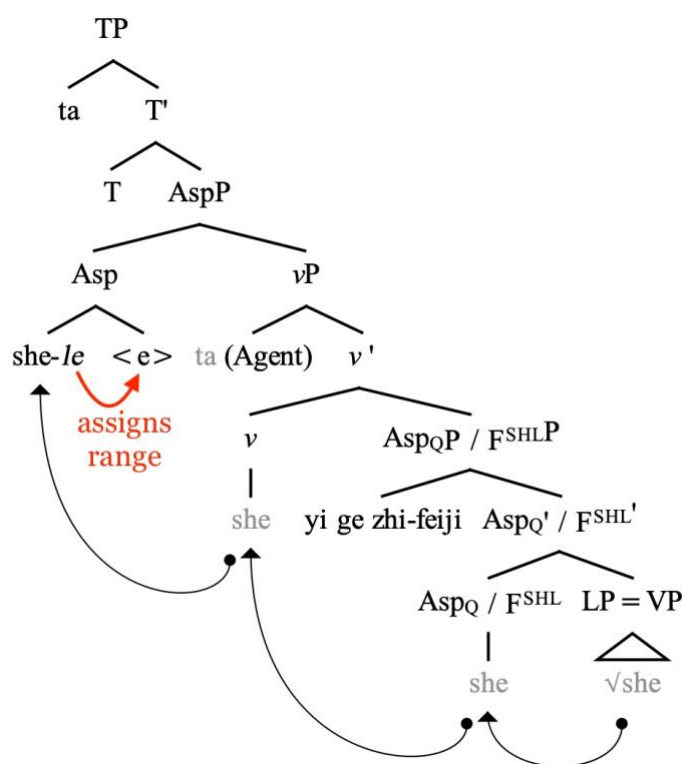
In diagram (202), the root turned verb *she* (“shoot”) moves to the *Asp* position because *-le*, being a bound morpheme, requires a stem³³. *-Le* assigns range to [*Asp*<*e*>] to yield a perfective reading, and it looks into its c-command domain searching for a head that can provide it with

³² Some authors (e.g., Soh 2014) have proposed that there are two types of *-le* in Mandarin: one suffixed to the end of a verb or verb series, the other to the end of a sentence. The present discussion is focused on the former.

³³ There is an alternative analysis. One could say that [*Asp*<*e*>] is assigned range by the abstract feature <*pfv*>, and being phonologically null, the feature needs the root for phonological support, hence the movement. The spell-out of [*√*ROOT + <*pfv*>], then, is /ROOT-*le*/. Since movement is still required, this alternative analysis is compatible with the argument I am going to make in this section.

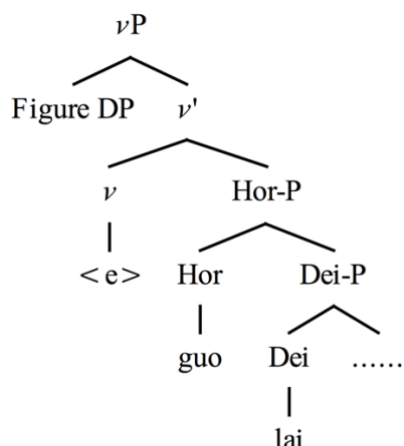
morphological support, namely, a stem. When a suitable head is found, it moves up to Asp through head movement and becomes the stem for *-le*. Although some authors (e.g., Huang et al. 2009) have claimed that verbs do not move to Asp in Mandarin overtly, they have arrived at their conclusion based on assumptions different from those behind XSM. While I acknowledge this difference, it should be noted that the main point of this section—namely, that MANNER and PATH are structurally distinct—can be made regardless of which approach one wishes to take. Incidentally, the fact that a Manner-V can be taken by *-le* and become its stem, as will be shown later, indicates that MANNER in Mandarin is realized as a head rather than an adjunct because adjuncts do not undergo head movement. This further confirms the structure of motion predicates we hypothesized in Chapter 1.

(202) Structural positions of *-le* and AspP



Now, recall the structure of PATH, which is reproduced below with *guo lai* (“cross come”) used as an example:

(203) Structure of PATH



On top of PATH is a ν P, which introduces a DP and assigns it the interpretation of a Figure. Not to be confused with the Agent-introducing ν P in (202), this Figure-introducing ν P is located right below MANNER³⁴. (The structural position of this ν P is in line with what has been proposed in previous studies, including Osei-Tutu (2019), Taherkhani (2019), and Benedicto and Salomón (2014).)

If MANNER and PATH are syntactically distinct, we will expect to see certain syntactic operations apply to MANNER independently of PATH. Furthermore, if these operations cannot apply to one part of PATH independently of another part of it, then we will have more reason to believe the distinction between MANNER and PATH is syntactically relevant. As I will show, the movement we saw in (202) is one such operation.

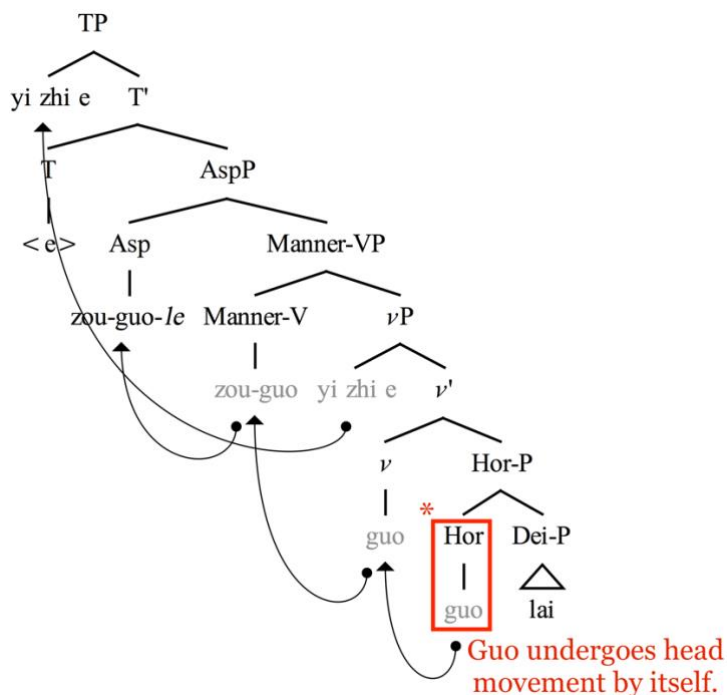
Sentence (204) shows that *-le* can take the heads in both MANNER and PATH. This is the result of the following derivation: First, *lai* (“come”) undergoes head movement from Dei to Hor and forms a complex head with *guo* (“cross”). Then, the complex head *guo-lai* undergoes head movement again through ν to Manner-V and forms another complex head *zou-guo-lai*. Finally, when *-le* searches for a head in its c-command domain, the structurally closest head it sees is the complex head in Manner-V, namely, *zou-guo-lai*. The complex head is then taken up to Asp through head movement. The derivation is illustrated in (205) and (206):

³⁴ To be consistent with the basic assumptions behind XSM, I assume the empty head of this ν P also needs range, and without evidence for the existence of an overt range assigner for [ν <e>] in Mandarin, I assume whatever assigns it range must be phonologically null.

- “A goose has walked over here.”

- (-Le finds the complex head *zou-guo-lai* and takes it up to Asp.)

(207) Illicit derivation in which one of the motion morphemes in PATH moves up by itself



³⁵ I mentioned earlier that there are two types of *-le* in Mandarin. How do we know motion morphemes in PATH can be a stem (or part of a stem) for a verb-series-final *-le*? Is it possible that they cannot, and that the *-le* in (204) is in fact a sentence-final *-le* that merges with a TP to its left? A quick look at the example below reveals that morphemes in PATH *can* be part of a stem for a verb-series-final *-le*, for it is clear that the *-le* in (i) is not in a sentence-final position.

- 120

- (208) **yi zhi e zou guo-le lai.*
 one CL goose walk cross-PFV come
 “A goose has walked over here.”

Most importantly, it is possible to raise the Manner-V *zou* alone without raising *guo* and *lai*, suggesting that one head is enough to provide all the morphological support *-le* needs:

- (209) *yi zhi e zou-le guo lai.*
 one CL goose walk-PFV cross come
 “A goose has walked over here.” [0603MANS]

- (210) [TP *yi zhi e* [AspP *zou-le* [MANNER-VP *ZOU* [_v [_{Hor-P} *guo* [_{Dei-P} *lai*]]]]]]

The behavior of *-le*, therefore, is an example of a syntactic operation that can target MANNER specifically but cannot do so with parts of PATH. This behavior is expected if MANNER and PATH are distinct syntactic components.

4.4.2 Other Evidence

Aside from the syntactic evidence above, there is semantic evidence for PATH and MANNER being different. The sentence below has a negation marker with a scope over PATH but not MANNER.

- (211) *Xiaoniao [MANNER-VP fei [NEG-P bu [PATH shang qu]]].*
 Small-bird fly NEG go-up go
 “The birdie cannot fly up and away.”

Sentence (211) is felicitous for a context where a birdie is flying but cannot ascend, perhaps because there are tree branches blocking its way up. Interestingly, it is not possible to have the negation marker scope over Dei-P but not Ver-P and MANNER; that is, *bu* cannot have a scope smaller than PATH:

- (212) *Xiaoniao [MANNER-VP fei [Ver-P shang [NEG-P bu [Dei-P qu]]]].
 Small-bird fly go-up NEG go
 “The birdie cannot fly up and away.”

Note that world knowledge is not the problem here. Logically speaking, (212) should be felicitous for the following context: The speaker is standing on the third floor of a building and looking out a window. She looks down and sees a birdie flying off of a windowsill on the second floor and ascending in her direction. The birdie is flying up, but as a consequence of doing so, it cannot be moving away from the speaker at the same time. Curiously, the scenario just described—though perfectly compatible with our intuitive understanding of the physical world—cannot be expressed with (212).

To be sure, when there is no Manner-V, Mandarin allows sentences like the following:

- (213) Xiaoniao shang bu qu.
 Small-bird go-up NEG go
 “The birdie cannot go up.”

At first glance, (213) appears to have the negation marker scope over Dei-P only. Upon closer examination, however, one notices that it cannot denote the scenario described above. That is, (213) cannot have the interpretation that the birdie is ascending but unable to move away from the speaker or reference point. Instead, the interpretation has to be that the birdie can neither ascend nor move away from the deictic center; put plainly, the negation marker must scope over both the vertical and deictic. In sharp contrast, (211) has a very similar surface word order, but the negation marker does not scope over *fei* (“fly”). Thus, (211) is entirely felicitous for a scenario where the birdie *is* flying around frantically and trying to ascend but something is blocking its way up. It now becomes clear that MANNER can fall outside the scope of negation whereas PATH cannot do so partially—a fact that is entirely expected if PATH is one unified component³⁶.

³⁶ To be sure, the syntax and semantics of negation in Mandarin are more complicated than the account provided here. For instance, consider (i), which is a predicate that denotes dispositional change:

i) Xiaoniao [zhan [bu [qi lai]]].
 Small-bird stand NEG rise come
 “The birdie cannot stand up.”

In sum, I have made several arguments in favor of treating MANNER and PATH as distinct components. The distinction, I have argued, is not only conceptual but also grammatical. First, as mentioned in section 2.3, PATH is semi-functional in that it rejects certain verbs whose semantics are perfectly in line with translational motion; in contrast, MANNER is lexical in nature because it accepts all kinds of verbs, even those whose core meanings have nothing to do with motion. Second, the motion morphemes in PATH behave as one unit, whereas MANNER can sometimes behave separately from PATH. This is shown by the fact that in certain contexts, the perfective marker *-le* may take up a manner verb without the motion morphemes in PATH, while taking up one motion morpheme without the other is illicit. Third, the negation marker *bu* can negate PATH without negating MANNER, while negating part of PATH seems impossible.

4.5 The Problem of PATH

In section 4.3.6, I pointed out a set of curious facts about PATH in Mandarin. First, the data show that morphemes for vertical and horizontal motion never co-occur, but there are plenty of instances where they co-occur with a deictic morpheme. This means that PATH in Mandarin allows two projections at most. Second, we found several instances where a deictic morpheme appears by itself, while a horizontal or vertical morpheme almost always appears with a deictic morpheme or an XP-_{Loc}. Though there are ten instances where a vertical morpheme appears by itself, we noticed that six of them actually denote dispositional change events and thus do not have a PATH. Therefore, the real number of “exceptions” is actually four.

It appears that *zhan* in (i) must be interpreted as “try to stand up” rather than “stand”, and the sentence would not make sense if the birdie is already in a standing position. I take this to be an example showing that lexical items (such as *zhan*) are susceptible to coercion/re-interpretation based on the syntactic environment they are in (a point already made in sections 2.5 and 2.6), and that *bu*, along with the PATH morphemes, plays an *indirect* role in determining how *zhan* should be interpreted in this particular context.

Nevertheless, our point about the distinction between MANNER and PATH still stands. Even though the negation marker does sometimes have a coercion effect on how a Manner-V is interpreted, in cases like (211) that effect appears to be completely absent. It seems, therefore, that whatever effect *bu* (along with the semi-functional PATH morphemes) has on certain manner verbs is not grammatical in the sense that it isn’t systematic and doesn’t reliably return a particular reading; it thus appears that *bu* truly does not have a scope over MANNER. We further note that insofar as *shang* in (213) must yield a coerced reading (i.e., “try to go up” rather than the usual “go up”), it only makes the distinction between MANNER and PATH more pronounced—simply because logically there could be, as mentioned before, a reading that is perfectly compatible with our intuitive understanding of the physical world. Thus, it is a very curious fact that Mandarin speakers forgo the logically available, intuitive reading of (213) and opt for one that involves coercion. This fact, however, becomes less curious once we accept PATH and MANNER as distinct linguistic components.

Keeping these exceptional cases in mind and anticipating an explanation in section 4.5.1.3, I will rephrase the set of facts as follows and call it *the Problem of PATH*:

(214) *The Problem of PATH*:

- (A) PATH can have two motion morphemes at most, and when there are two, one of them must be deictic.
- (B) While a deictic morpheme can appear by itself, horizontal and vertical morphemes (almost always) appear along with a Dei-P or an XP-_{Loc}.

In the following sections I will provide a tentative solution.

4.5.1 Solution: Overview

As a hypothesis, let us put forward the following set of principles:

- (215) A PATH must be anchored in space.
- (216) The range assigned to [Dei<e>] by *lai* (“come”) and *qu* (“go”) contains a variable x , which can be bound and assigned different geometric interpretations by *guo*, *shang*, *xia*, and other motion morphemes. Specifically, the range assigned to [Dei<e>] can be formalized as follows:

[*lai*] = move toward {the deictic center}, which is construed as an $\{x\}$.

[*qu*] = move toward an $\{x\}$ that is not {the deictic center}.

The first principle has already been discussed earlier and needs no further explaining. To recap, a PATH needs to be interpreted as existing at some referential location, just as a vector needs to exist somewhere that can be pinpointed using coordinates in a Cartesian coordinate system.

The second principle requires elaboration. Strictly speaking, there are two variables here that need to be teased apart. The first one is {the deictic center}. Whenever a deictic expression is used, there must be a deictic center (i.e., a reference point), without which the expression would not make sense. Very often {the deictic center} is interpreted as the speaker’s position. For instance, suppose somebody says, “Come!” His intention is usually for the listener to move toward his

position. Sometimes, however, {the deictic center} may be interpreted as the listener's position. Imagine someone says in an email, "I will come at 3:30." Certainly, the writer of that email means she will move toward the reader's position at 3:30 instead of toward the position of herself. It is also possible that {the deictic center} is interpreted as something other than the positions of the speaker and the listener. When telling the story about the three little pigs, for example, I might say, "The wolf has come to the pigs' house." Here, {the deictic center} does not literally refer to my or my listener's position since the story is obviously not about either of us. Rather, what I mean is that the wolf has moved to the pigs' house, and I simply take the pigs' perspective, mentally projecting myself into their position (i.e., their house). The upshot is that {the deictic center} is a variable whose interpretation depends on the context. However, this variable has no bearing on the first half of my solution to *the Problem of PATH*, and in order to keep the following discussion as simple and focused as possible—at least until we reach the second half of the solution—, {the deictic center} will always mean *the speaker's position* in the next two sections unless otherwise specified. (Readers are welcome to try other perspectives and see if my argument will still hold.)

But *the speaker's position* itself may be conceptualized in different ways. What exactly is a "position"? Or more generally, in what geometric shape is a "goal" represented in our minds when we use the words *come* and *go*?³⁷ Is it a zero-dimensional point, a two-dimensional plane, a three-dimensional space, or even one of two sides divided by a line? This is where the second variable, i.e., { x }, comes in. The possible values of { x } are basic (probably innate) geometric concepts, including *point*, *line*, *plane*, and *space* at the very least. Without them, it is hard to see how humans could navigate through the environments they live in. In the rest of this dissertation, when the term *variable x* or the notation { x } is used, it refers to this second variable, which is interpreted as *point*, *plane*, *space*, or some other geometric concept, depending on what binds it. It should not be confused with the first variable, namely, {the deictic center}. Again, at least for the first part of my solution, {the deictic center} is not relevant to *the Problem of PATH*.

I will break down my solution into two parts. The first part is focused on the variable x , the second on spatial anchoring. Though discussed separately, they are both integral to the solution.

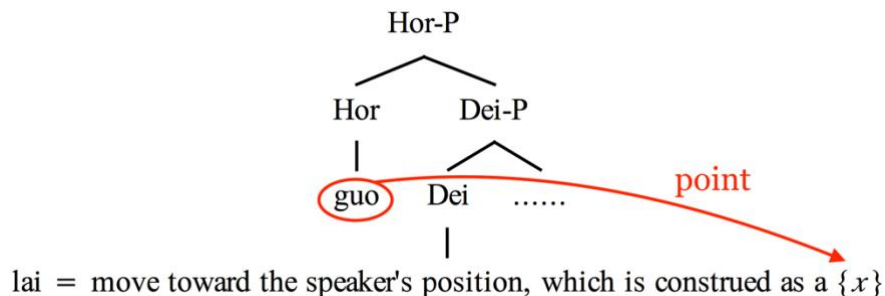
³⁷ Notice that *go* does not simply mean *move away from {the deictic center}*. When we use the word or its Mandarin equivalent *qu*, there is almost always an explicit or implicit goal. That's why when a goal is not explicit enough, we will see a response like the one uttered by B below.

A: "Let's go." B: "Go where?"

4.5.1.1 Solution—Part 1: Variable Binding of $\{x\}$

Based on these two principles, let us begin by examining how a PATH is composed. First, consider *guo lai/qu*, which has the following structure. (For illustration, I will use *lai* only from now on.)

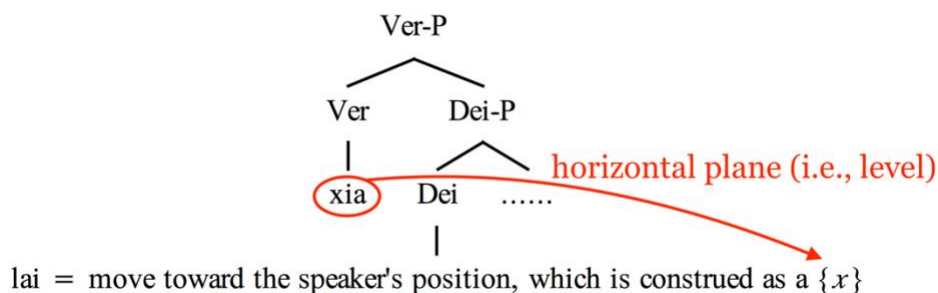
(217) Structure of *guo lai* (“cross come”)



Lai assigns [Dei<e>] range, which is *move toward the speaker's position, which is construed as a $\{x\}$* , where x is a variable. *Guo*, in a similar fashion, assigns range to [Hor<e>] and yields a reading of horizontal motion. Furthermore, as posited in (216), *guo* is able to bind $\{x\}$ and give it a geometric interpretation. Tentatively, let us assume this interpretation is the geometric concept of a point. Since $\{x\}$ is interpreted as a point, the PATH composed from these two projections denotes a path that moves horizontally toward the point that the speaker is at. At first glance, it is what the phrase *guo lai* means.

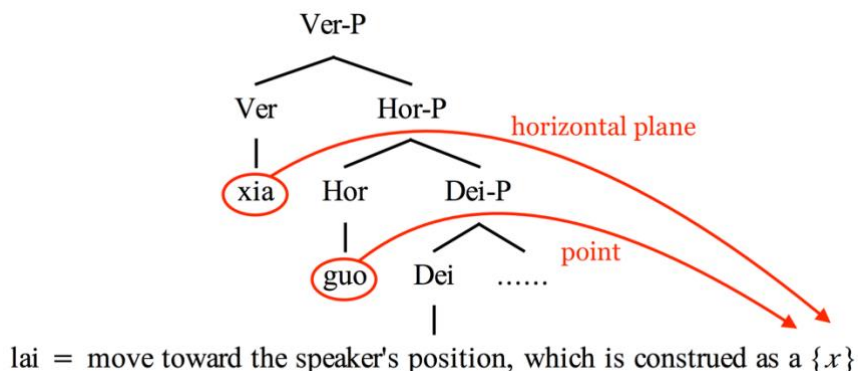
Now, consider *xia lai*. Similarly, *xia* assigns range to [Ver<e>] and yields a reading of vertical downward motion. Moreover, it binds the variable x and—again, let us assume—gives it a geometric interpretation of a horizontal plane (i.e., a level). The resulting reading is a path that moves downward toward the level that the speaker is on. We will come back later to examine whether or not this predicted interpretation is really what the phrase *xia lai* means. For now, the structure is illustrated below:

(218) Structure of *xia lai* (“go-down come”)



Finally, consider the phrase **xia guo lai*. The three range assigners provide semantic content to their corresponding heads the same way as described above. However, *xia* and *guo* now compete to bind $\{x\}$. Since one variable cannot have two different values at the same time, **xia guo lai* is an ungrammatical phrase. The fact that PATH cannot have three motion morphemes at the same time has an explanation now.

(219) Structure of **xia guo lai* (“go-down cross come”)



One may object that this solution is ad hoc because it postulates a variable $\{x\}$ and assumes range assigners to [Hor<e>] and [Ver<e>] give $\{x\}$ different interpretations. To counter this objection, we have to demonstrate that the postulation makes novel predictions that cannot be made without it.

First, consider the interpretation of *xia lai*, which is predicted by my solution to be *move downward toward the horizontal plane (i.e., level) that the speaker is on*. Indeed, this is a novel prediction, for without $\{x\}$ and the binding mechanism, the phrase *xia lai* would be interpreted as *move downward toward the speaker's position*, where *the speaker's position* can only receive one

interpretation. Previous studies on this topic, such as Chen (2017), have simply interpreted *the speaker's position* as the speaker's body, which, again, would be the only interpretation if there were no variable whatsoever. Now, let's consider the following scenario:

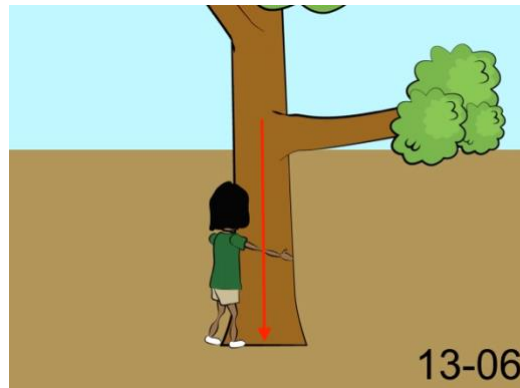


Figure 4.14: Prompt 13-06

(220) yi ge nūhai cong shu shang pa-le xia lai.
 one CL girl from tree top climb-PFV go-down come

“A girl climbed down from the top of the tree.”

[1306MANSD]

The girl in Figure 4.14 is moving in a completely vertical direction and is not moving toward the speaker. Under the analysis without $\{x\}$, the felicitous use of *lai* in (220) would require an explanation. Under the analysis with $\{x\}$, however, *xia lai* would be interpreted as *move downward toward the level that the speaker is on*, and the acceptability of *lai* in this context would follow straightforwardly. Thus, our novel prediction is correct.

Skeptical readers may maintain that there is no need to postulate the variable x and the values. They may propose that when a speaker uses *xia lai* to describe completely vertical downward motion, she simply imagines her body being at a location on the Z-axis (the vertical axis of a Cartesian coordinate system), a location toward which the figure is moving. Under this view, the participant who gave us (220) may have imagined herself being at the bottom of the tree when she produced the sentence. This way, the phrase *xia lai* can still be interpreted as *move downward toward the speaker's position (=the speaker's body)*, and no variable is needed. However, consider the following:

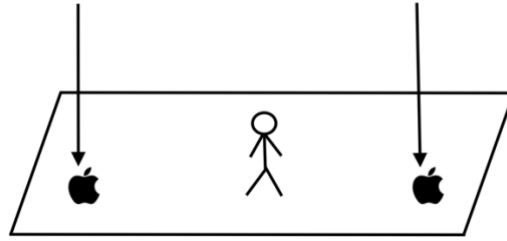


Figure 4.15: Two apples falling down on both sides of the speaker

- (221) liang ke pingguo (tong shi) diao xia lai.
 two CL apple (same time) fall go-down come
 “Two apples fall down (simultaneously).”

In Figure 4.15 two apples simultaneously fall down, one on the right side of the speaker, the other on the left side. Sentence (221) is felicitous for this scenario. If *lai* means *move toward the speaker's position*, and if—as opponents of my solution will have to claim—*the speaker's position* cannot be interpreted as anything other than the speaker's body (since eliminating the variable x bars the possibility of multiple interpretations), then she must imagine herself being in a different place because neither apple really moves toward her body. But how exactly does she imagine that? One way is to say that the speaker simultaneously projects herself mentally to the two locations where the apples end up. However, this may be psychologically plausible for two apples, but highly unlikely for a scenario where, say, fifty apples simultaneously fall down. A more plausible option is to say that the speaker does not imagine herself being anywhere other than her physical location. Instead, she simply conceptualizes *her position* as a horizontal plane (i.e., the parallelogram in Figure 4.15) in this context. Put plainly, when she uses the word *lai* in (221), she does mean the apples are moving toward her position, but her “position” is construed as a 2-D, horizontal plane due to the presence of a range assigner to [Ver<e>], which is *xia* in this case. Thus, our solution provides a psychologically more plausible account for scenarios like Figure 4.15 by introducing $\{x\}$ into the meaning of *lai*.

If one still insists that a speaker can simultaneously project herself mentally to as many different places as needed in the context above, then they should consider the following context:

- (222) Diren cong simianbafang (tongshi) guo lai.
 Enemy from four-face-eight-direction (same-time) cross come
 “The enemies come from all directions (simultaneously).”

If my proposal is correct, *lai* in the sentence above should be interpreted as *move toward the point the speaker is at* because of the geometric interpretation assigned by *guo*. Therefore, (222) may be illustrated as the following diagram, which represents a bird’s-eye view of the enemies’ motion and the speaker’s location. This illustration is accepted by my consultants as the right interpretation.

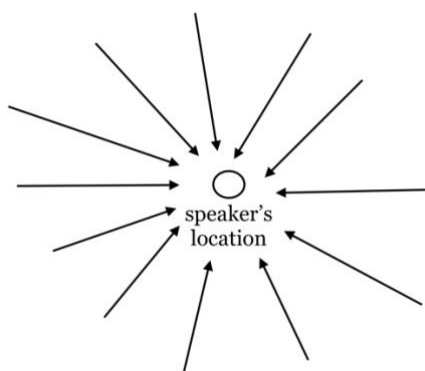


Figure 4.16: Illustration of (222). Arrows indicate the enemies’ motion.

In contrast, if the variable and different values do not exist, Figure 4.16 should not be the only possible scenario for (222). Instead, the sentence would be felicitous for at least two other scenarios (Figure 4.17), both of which are rejected by my consultants. Let me elaborate.

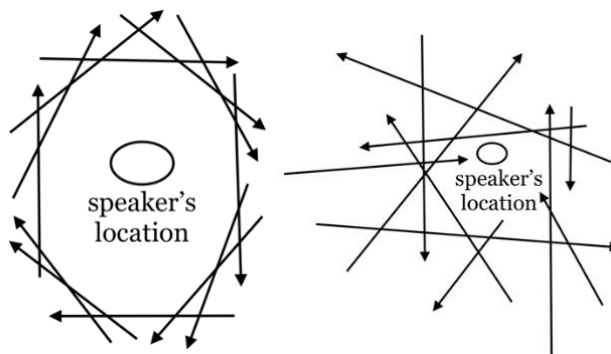


Figure 4.17: Logically possible scenarios for (222). Arrows indicate the enemies’ motion.

Suppose there is really no need to posit a variable and different geometric interpretations, and suppose that when we use *lai*, we as speakers sometimes exercise the ability to imagine ourselves being somewhere other than our physical location. If this is true, then *lai* would have exactly the same meaning in (221) as in (222) because—once again—there is no variable x and therefore no room for different interpretations. Now, what is curious is this: The speaker in Figure 4.15 (corresponding to (221)) is able to imagine herself being at different locations simultaneously (thereby licensing the use of *lai*), but the speaker in Figure 4.17 (corresponding to (222)) cannot. (Recall that Figure 4.17 has been rejected by my participants as possible scenarios for (222).) Logically, if the speaker mentally projects her body to where the heads of the arrows are in Figure 4.17, the enemies will be moving horizontally toward her imagined bodies from all directions, and sentence (222) should be felicitous. Though logically possible, this still does not make (222) acceptable. The only acceptable scenario for (222), again, is Figure 4.16. And notice that if the speaker of (222) is physically outside the event and projects herself into the scenario represented by Figure 4.16 (perhaps she is telling a story about a siege), the only possible position she can put herself in is the point in the middle (represented by the circle).

Thus, even if we accept that a speaker always mentally projects herself somewhere else when a figure or figures are not moving toward her body's physical location—which seems rather implausible in my opinion—, there clearly are restrictions on where she can project. In the context of *xia lai*, the area where she can project is the plane she is on. In the context of *guo lai*, that area is just a single point, not multiple points or a plane. But where do these restrictions come from? An analysis without the variable x does not give us an answer. In contrast, my proposed solution does: The appearance of there being such restrictions comes from the variable x in the deictic and the different geometric interpretations assigned by the motion morphemes that assign range to [Hor<e>] and [Ver<e>]. Moreover, this solution does not resort to the psychologically implausible process of imagining oneself being in multiple positions simultaneously, and it can partially explain *the Problem of PATH*.

There might be another potential objection to my solution. One might say that the speaker in Figure 4.15 uses the plane (i.e., the parallelogram, even though it is imaginary) as a deictic center without imagining herself being at multiple locations simultaneously. This way, the denotation of *lai* will be sufficient without $\{x\}$. Under this view, the speaker simply identifies something—imaginary or real—toward which all figures move and uses it to interpret the variable

{the deictic center} in the denotation of *lai*. (Recall that there are two distinct variables in a deictic: {the deictic center} and {*x*}. We have been interpreting the former as *the speaker's position* to keep the discussion focused, but as mentioned earlier, it has the potential to be interpreted as something or someone else's position.) The problem with this view, however, is that for any number of paths, one can almost always identify something that all the paths lead to. For instance, in Figure 4.18 there are two birds moving horizontally in opposite directions. We could identify an imaginary plane (the parallelogram) that they both move to and use it as {the deictic center}. Yet, sentence (223) is still not felicitous for Figure 4.18:

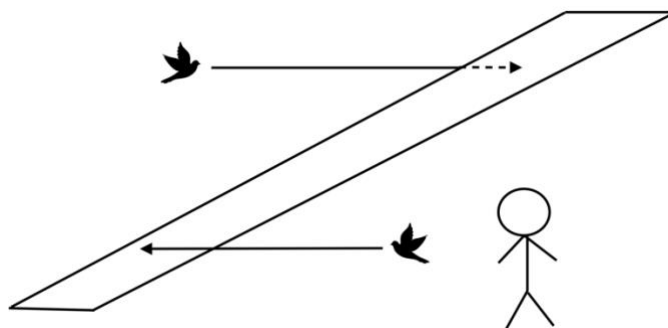


Figure 4.18: Two birds moving horizontally toward a plane (Stick figure for scale and orientation)

- (223) #Liang zhi niao (tongshi) fei guo lai.
 Two CL bird (same-time) fly cross come
 “Two birds fly over here (simultaneously).”

Why is it not felicitous? To be concrete, assume we as speakers take an observer perspective for the scenarios of Figure 4.16 and Figure 4.18, as if we are telling stories about both events. We then interpret {the deictic center} as whatever goal we can identify that is shared by the figures. The crucial question is why the use of *guo lai* is felicitous for the event in Figure 4.16 but not for the one in Figure 4.18, even though in both events the figures are moving horizontally toward some goal? It is apparently not enough to find a common goal and use it to interpret {the deictic center}. Whatever {the deictic center} refers to, it must be in a certain orientation and have certain geometric features (a point, a (horizontal) plane, etc.), decided by a structurally higher motion morpheme (*shang*, *xia*, *guo*, etc.) that co-occurs with the deictic. That “added-on” geometric information is assigned to the variable *x*.

We have seen that positing a variable x and different geometric interpretations not only partially explains *the Problem of PATH* but also answers questions that are unrelated to it. Let us extend this hypothesis beyond the horizontal and vertical and consider egressive events, in which a figure moves out of an enclosed space. Consider the following scenario and sentence. To keep the discussion focused, assume again that {the deictic center} is interpreted as the speaker's position:

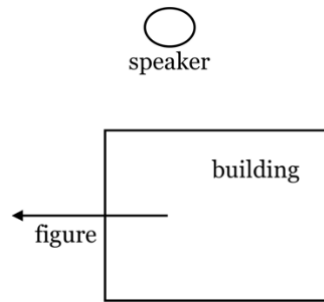


Figure 4.19: A bird's-eye view of an egressive event

- (224) Huihui chu lai le.
 Huihui exit come PFV
 “Huihui has come out.”

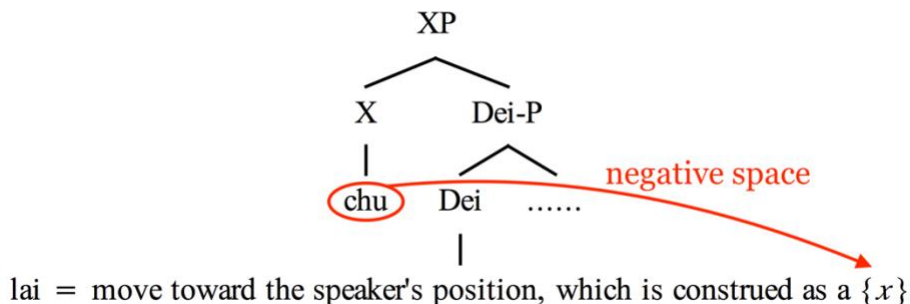
This sentence above is felicitous even though the figure, Huihui, is actually moving away from the speaker. Moreover, *chu lai* is also felicitous when used to talk about a distant egressive event that one cannot witness:

- (225) Huihui cong Mammoth Cave li chu lai / #qu le.
 Huihui from Mammoth Cave inside exit come / #go PFV
 “Huihui has come / #gone out of Mammoth Cave.”

The speaker of this sentence can be in Indiana physically, not knowing which exit Huihui came out of or whether that exit is facing north. Without all this knowledge, the speaker can (indeed, has to) say *chu lai* instead of *chu qu*. To push this scenario to the extreme, all this is possible even if the speaker has never been to Mammoth Cave and has no knowledge about the area's topography, such as the elevation and depth of the cave. Under these circumstances, how

does the speaker know which deictic morpheme is the felicitous one? The answer emerges if the use of *lai* in (225) does not depend on what point or plane (i.e., altitude level) he is currently on. All he needs to know—perhaps with the help of GPS—is that Huihui has entered a negative space³⁸ that he is currently in, i.e., the space outside the cave. Structurally, *chu lai* is illustrated as follows:

(226) Structure of *chu lai* (“exit come”)



In this structure, the morpheme *chu* provides {*x*} with a reading of negative space. The path composed out of this structure is a path that moves to the negative space where the speaker is, which is a correct prediction. Most importantly, range assigners to [Hor<e>] and [Ver<e>] cannot appear in this structure because, as mentioned earlier, they would assign {*x*} an interpretation of *point* and *level*, respectively—both different from the geometric concept of *negative space*. Again, this prediction is correct:

(227) *Yi zhi xiaoniao fei chu xia lai.
 one CL small-bird fly exit go-down come
 “A birdie flies out and downward.”

To sum up this section, I proposed that the range assigned to [Dei<e>] contains a variable, which may be bound and assigned values by other range assigners. Since *guo* and *shang/xia* have different values to assign, they cannot co-occur. Based on this variable and binding mechanism, I also presented several novel predictions that were unrelated to *the Problem of PATH*. Specifically, these predictions showed that speakers do not interpret the deictic by mentally projecting

³⁸ I am using the term *negative space* as defined in architecture. A positive space “has a defined shape and a sense of boundary or threshold between in and out” (Frederick 2007). A negative space is the opposite.

themselves or finding a common goal for multiple figures. Instead, depending on what binds the variable x , the goal must have certain geometric features and orientations. Finally, I extended my proposal beyond the horizontal and vertical and correctly predicted that egressive motion predicates do not allow the occurrence of Hor-P or Ver-P³⁹. Thus, the variable and binding mechanism have independent empirical support. Let us now turn to the second part of my solution, namely, trajectory anchoring.

4.5.1.2 Solution—Part 2: Finding an Anchor in Space

I have partially solved *the Problem of PATH* by hypothesizing that the denotation of a deictic contains the variable x , which can be bound and assigned a geometric interpretation by another motion morpheme in PATH. Once $\{x\}$ is bound, no further binding can happen. This is why in our data we didn't find any PATH that has motion morphemes for all three dimensions—even though we do have prompts depicting three-dimensional paths. I will now tackle the rest of the problem, starting by explaining why when there are two motion morphemes in PATH, one of them is deictic.

Recall that one of the principles I posited is the following:

(228) A PATH must be anchored in space.

What I mean by (228) is that a PATH must denote a vector that can potentially be described in relation to a set or sets of specific coordinates in the Cartesian coordinate system. Put plainly, a motion predicate in Mandarin must be interpreted as an event that takes place somewhere—as opposed to anywhere—in space⁴⁰. As has been mentioned before, this is one of the implications of conceptualizing a path as a vector, which is defined in a Cartesian coordinate system with sets of coordinates, which in turn specify positions in space. When examining the data, we noted that a post-Manner-V directional phrase must have a referential XP-_{Loc}, and we attributed such a requirement to this very principle. As we will see, this principle of spatial anchoring is integral to our solution to the problem.

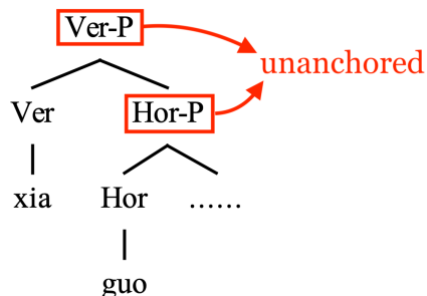
³⁹ This means that the ingressive and egressive morphemes *jin* (“enter”) and *chu* (“exit”) are “in the same bag” as the range assigners to [Hor<e>] and [Ver<e>], so to speak. What they share is the ability to bind $\{x\}$ and thereby modulate a vector.

⁴⁰ Linguistically, the need for an anchor is not an uncommon phenomenon. For instance, every matrix clause in English needs to be specified for tense as if it needs to be anchored somewhere along a timeline.

Recall that in our data we never saw morphemes for horizontal and vertical motion co-occur in the same PATH, even though plenty of prompts depicted motion involving those two dimensions. In other words, there are no instances of *xia guo* (“go-down cross”), *shang guo* (“go-up cross”), *guo xia* (“cross go-down”), or *guo shang* (“cross go-up”). On the other hand, the data have ample instances of a vertical or horizontal along with a deictic morpheme.

Now, if the meanings of *xia*, *shang*, and *guo* are relational in nature—in the sense that a change of positions is described in relation to an axis rather than a set of specific coordinates—then these three morphemes are not spatially anchored. Take a concrete example. If *shang* simply means that as time passes, the figure’s position in relation to the Z-axis changes in the positive direction—say, from (a, b, c) to $(a, b, c+1)$, where a , b , and c are unspecified—then *shang* does not denote an anchored path because there is no way to tell where the figure was, is, or will be in the Cartesian system without knowing the values of a , b , and c . (In other words, the vector that *shang* denotes can be anywhere in space.) And if the vertical and horizontal morphemes in Mandarin are really unanchored, then principle (228) correctly rules out cases like the following:

(229) Structure of **xia guo* (“go-down cross”)

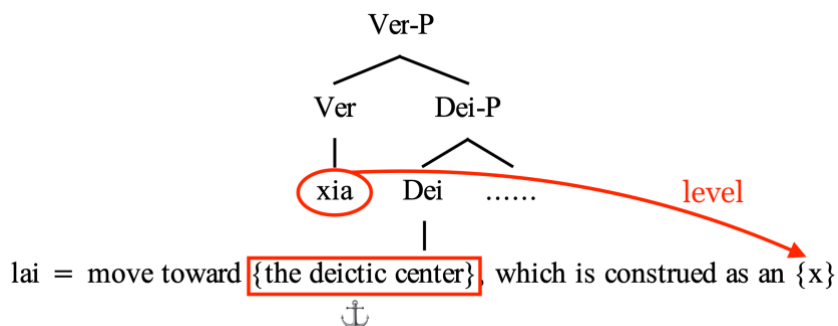


The problem with (229) is that Hor-P and Ver-P only specify whether a vector is parallel or perpendicular to the Z-axis. They do not say anything about where the vector is.

In contrast, the deictic morphemes are different in that the paths they denote are spatially anchored, thanks to the variable {the deictic center} in their denotations (recall the discussion in section 4.5.1). Having to interpret {the deictic center} means that the language user is forced to choose a specific position—usually his own—from which he views the motion event, and by doing that, he provides the PATH with a spatial anchor. This nicely explains why there are plenty of instances in the data where a PATH has a deictic morpheme when its corresponding prompt does

not depict a change of positions in the deictic dimension. Let us take *xia lai* (“go-down come”) as an example to illustrate:

(230) Structure of *xia lai* (“go-down come”)



The PATH above denotes a vector that moves downward toward the deictic center, which is conceptualized as a level. This is because the vertical morpheme *xia* binds {x} and assigns it a geometric interpretation of *level* (i.e., *horizontal plane*). Crucially, the variable {the deictic center} needs to be assigned an interpretation, too, be it the speaker’s position, the listener’s position, or some other position. By having a position in space, {the deictic center} provides the motion event with an anchor, hence the ⚓ notation.

Importantly, notice that the line of reasoning presented thus far predicts that a deictic motion morpheme, by virtue of having {the deictic center} as a spatial anchor, is perfectly capable of constituting a PATH by itself, without help from another motion morpheme or a referential XP_{-Loc}. As pointed out earlier, our data includes many instances of PATH in which a deictic morpheme appears by itself—exactly as predicted.

Furthermore, part of *the Problem of PATH* is the fact that in our data the horizontal and vertical morphemes never appear by themselves without a Dei-P or XP_{-Loc}, which seems quite peculiar when contrasted with the behavior of the deictic morphemes. (To be sure, there are “exceptions,” and I will address them in the next section.) Once the need of spatial anchoring is taken into account, however, the mystery disappears. The vertical and horizontal morphemes need to merge with a Dei-P because the latter provides a spatial anchor in the way illustrated in (230). The need to merge with an XP_{-Loc} is exactly the same. Referring to some specific landmark in an event—be it a river, a fence, a pond, a tree, or a hill—an XP_{-Loc} serves as an anchor for the path.

We can make another prediction based on the principle of spatial anchoring: If an XP_{-Loc} that serves as the anchor for a PATH is a DP, that DP must refer to a landmark that is located

somewhere in the event. Put differently, we predict that a generic DP is unable to serve as an anchor. The following sentence suggests this is the correct prediction:

- (231) Pa (*shang) shan dui jiankang hao.
 Climb (*go-up) mountain for health good
 “Climbing mountains is good for health.”

The DP *shan* (“mountain”) is generic in this context and does not refer to any specific mountain(s) in the world. Therefore, the upward motion denoted by the vertical morpheme *shang* (“go-up”) cannot be anchored by it. I should point out that without appealing to the principle of spatial anchoring, it would not be obvious at all why *shang* cannot appear in this context, given that mountain climbing typically involves moving from a low altitude to a high altitude.

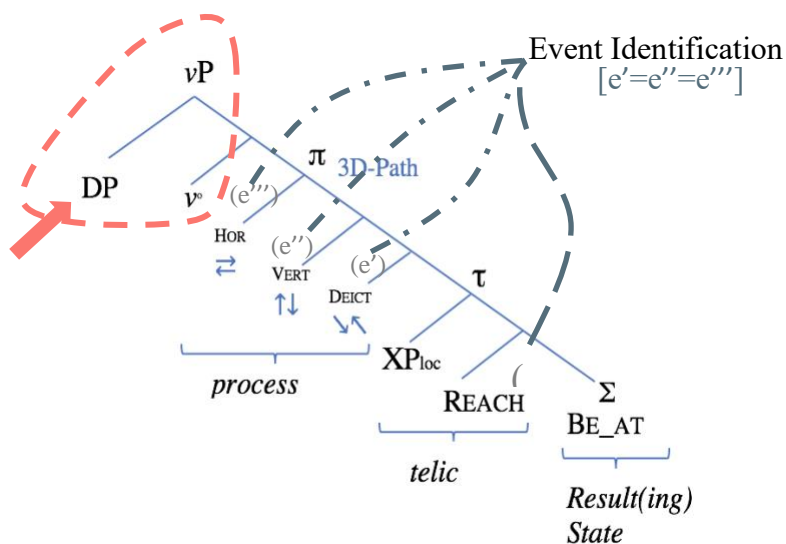
At this point, we seem to have addressed every aspect of *the Problem of PATH*. There is, however, a potential objection to the present solution. One may question whether the two principles proposed here are really sufficient to rule out predicates with more than two motion morphemes. Specifically, consider again the following illicit structure that we ruled out based on the variable binding mechanism:

- (232) *[_{Ver-P} xia [_{Hor-P} guo [_{Dei-P} lai]]]

In the last section I attributed its ungrammatical status to the fact that the variable *x* in the denotation of *lai*, once bound and assigned an interpretation by one of the other two morphemes, can no longer be bound by the third morpheme. However, why does the third morpheme have to bind $\{x\}$ in order to appear in the structure? In other words, why can’t it just exist in PATH without competing for $\{x\}$? To address this potential objection, I should take a step back and explain how anchoring works in detail.

Let us begin with an important insight from previous research. Taking a Neo-Davidsonian approach, Benedicto et al. (2019) argue that verbs in PATH have their own event arguments. Through an Event Identification operation, the verbs are interpreted altogether as one event (see below).

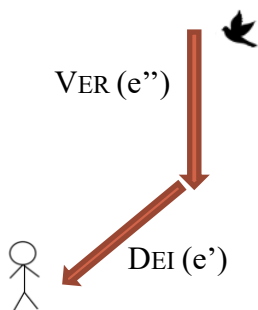
(233) Event identification of PATH



Benedicto et al. (2019)

Importantly, they note that through this Event Identification operation, the result is an intersective vector. For example, when a deictic event is identified with a vertical event, the whole event does not end up like (234), in which the two events take place consecutively. Instead, what obtains is one single vector. This is different from the Event Identification that takes place between PATH and REACH in (233). Though they are identified as one event, too, PATH and REACH do happen consecutively. (A figure cannot reach a goal without undergoing translational motion first.) Indeed, in footnote 6 in their work, Benedicto et al. (2019) leave open the possibility that “the *Event Identification* that takes place between the three V’s in the PATH substructure is not exactly of the same type as the one between PATH and REACH.”

(234)



But if the Event Identification of PATH is truly different, what makes it that way? What triggers this type of Event Identification and ensures that a PATH does not end up like the one in (234)? Perhaps in Mandarin, the variable binding mechanism is responsible for just that. In other words, it may be that when $\{x\}$ in a deictic morpheme is bound and assigned an interpretation by

another motion morpheme, this type of Event Identification is triggered between the deictic and the binder.

Furthermore, suppose that the events denoted by *lai* (“come”) and *xia* (“go-down”) have the (very rough) Neo-Davidsonian representations in (235) and (236), respectively:

(235) $\exists e'$ [displace (e') & goal ({the deictic center} construed as $\{x\}$, e')]

(236) $\exists e''$ [displace (e'') & vertical (down, e'')]

Now, if binding happens and triggers Event Identification, then the event of *xia* (e'') will become identical with the event of *lai* (e'). Consequently, the former will have access to the goal function in the latter, which contains {the deictic center}, which in turn can serve as a spatial anchor. The two principles I proposed as the solution to *the Problem of PATH* are now linked in the following way:

(237) $\{x\}$ in a deictic is bound by a motion morpheme.

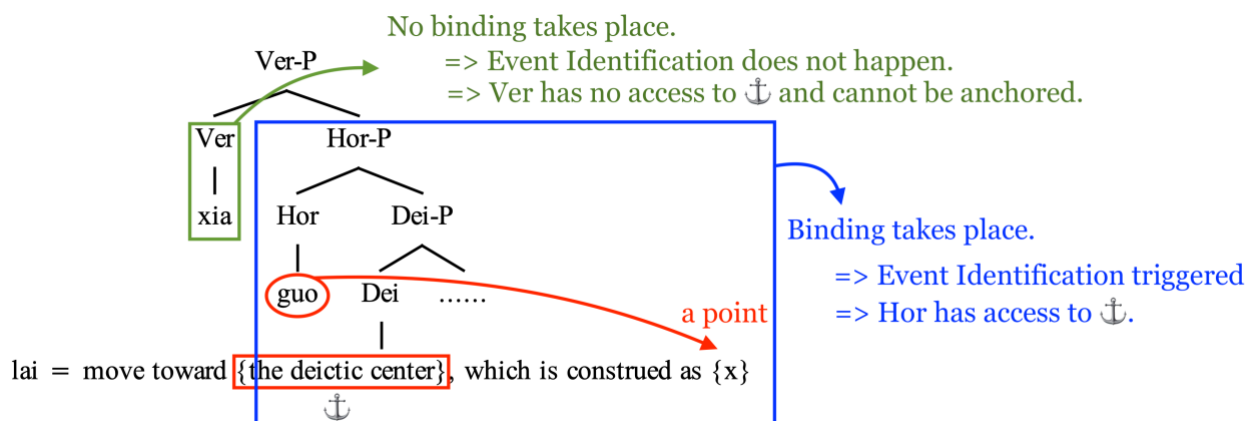
→ The binding of $\{x\}$ triggers the Event Identification of PATH.

→ The event denoted by the binding motion morpheme can be anchored.

If all this is on the right track, we can address the potential objection raised earlier; that is, why must (232) be illicit? Why can't either *xia* or *guo* refrain from binding $\{x\}$ to avoid competition? The answer is that if either *xia* or *guo* gives up binding $\{x\}$, it will not be identified with the event denoted by the deictic and will not be anchored as a result. But if *xia* and *guo* do compete for $\{x\}$, then ungrammaticality ensues in the way outlined in the previous section. This is illustrated in (238).

To be sure, the process described above is very likely to be language-specific, and I have no intention of claiming that languages other than Mandarin behave in the same way. However, with respect to Mandarin motion predicates, I believe what has been outlined above is a promising solution to *the Problem of PATH*, which is repeated in (239):

(238) Explanation for **xia guo lai* in terms of anchoring



(239) *The Problem of PATH*:

- (A) PATH can have two motion morphemes at most, and when there are two, one of them must be deictic.
- (B) While a deictic morpheme can appear by itself, horizontal and vertical morphemes (almost always) appear along with a Dei-P or an XP-_{Loc}.

To sum up, (A) exists because the variable x in a deictic morpheme can only be bound by one other morpheme. Should there be a third motion morpheme in PATH, that morpheme has to either compete for $\{x\}$ or refrain from binding and stay unanchored as a result. Both are unacceptable in Mandarin. The other constraint, (B), exists because the denotation of a deictic morpheme has $\{\text{the deictic center}\}$, which can serve as an anchor. In contrast, the horizontal and vertical morphemes do not have an anchor in their denotations, hence the reliance on either a Dei-P or an XP-_{Loc}.

4.5.1.3 The “Exception” Cases and Additional Predictions

In this section, I am going to address several issues and questions related to *the Problem of PATH*. At first glance, some of them might look like evidence against the solution I put forward. Upon closer examination, however, I believe they are in fact exactly what is predicted by it.

First, one may ask why when PATH has two motion morphemes, the deictic one is always the structurally lower one. Though the structural position of Dei-P is hypothesized to be the lowest,

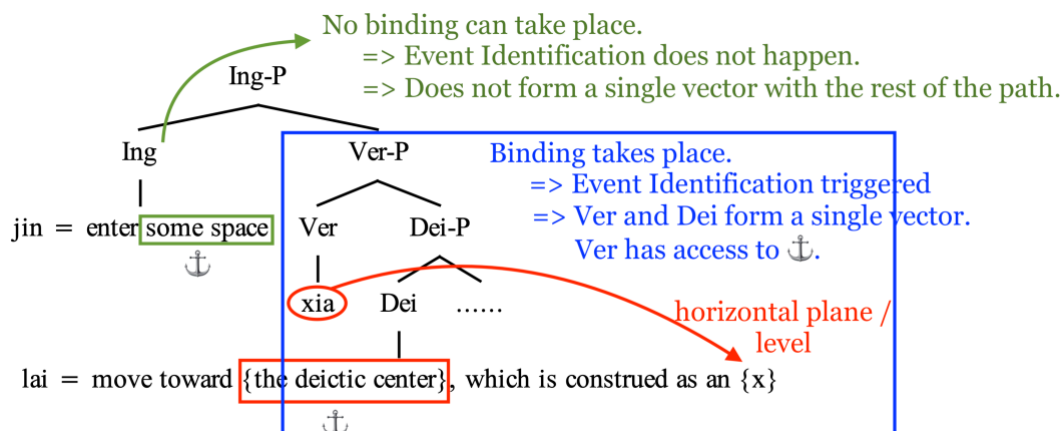
it is still a legitimate question why PATH cannot be configured any other way. With the solution at hand, we can now easily answer this question: A deictic must be structurally lower than the other morpheme in path because binding would not take place otherwise. That is, if a deictic c-commanded, say, a vertical, the latter would not be able to bind $\{x\}$ and would remain unanchored as a result. Thus, our solution can nicely answer this potential question.

Second, I noted in the summary of the data (section 4.3.6) that the ingressive and egressive morphemes never co-occur with a vertical or horizontal morpheme, and I partially explained this fact in section 4.5.1.1 based on variable binding. However, one can argue that the ingressive and egressive by themselves denote motion events that are already anchored because an event of entering or exiting always presupposes the existence of a specific space or area that the figure can enter or exit. (Indeed, we saw plenty of predicates in the data where an ingressive or egressive appears by itself without a Dei-P or XP-_{Loc}. For an example, see section 4.3.5.7. Also see fn. 26.) Thus, why should the following sentence be ungrammatical? Specifically, even though in (240) *xia* binds the variable *x* in *lai*, thereby forcing *jin* to refrain from binding, it does not cause *jin* to be unanchored. Why, then, is this PATH still illicit?

- (240) *Xiaoniao fei jin xia lai.
 Small-bird fly enter go-down come
 “The birdie flies in and down.”

The answer becomes clear when we recall that in Mandarin, the Event Identification of PATH is triggered by the binding of $\{x\}$. Thus, even though the event denoted by *jin* in the sentence above is already properly anchored—because the entering event must take place at the location of the space/area to be entered—, that event is not identified with the events denoted by *xia* and *lai* (because, again, *jin* cannot bind the $\{x\}$ in *lai* since it has already been bound by *xia*). In other words, the sentence above cannot be acceptable for a mono-eventive reading. As predicted, when forced to get a reading out of (240) as if it were a real sentence, I find that the only possible way for me is to interpret it as two consecutive events: One in which the birdie enters something, followed by the other in which the birdie comes down. Our solution, again, provides a straightforward explanation without making additional assumptions.

(241) Explanation for **jin xia lai* (“enter go-down come”)



Finally, remember that the data contains ten instances of a vertical morpheme appearing without a Dei-P or an XP-_{Loc}. In order for our solution to hold, these “exceptions” must be properly addressed. As pointed out in section 4.5.1, six of these ten instances actually correspond to events of dispositional change, and therefore they can be put aside. The real “exceptions” are 0609MANSD, 0609MANCT, 0302MANZM, and 0303MANZM. The first two are shown below:

(242) yi ge nanhai bao qi-le yi zhi e xiang you fang zou qu.
 one CL boy hug *rise*-PFV one CL goose toward right side walk go
 [0609MANSD]

“A boy picked up a goose and walked toward the right.”

(243) nanhaizi dun xia lai bao qi ta qian mian de yi zhi e
 boy squat go-down come hug *rise* 3rd front face DE one CL goose
 wang qian zou.
 toward front walk
 [0609MANCT]

“The boy squats down, picks up a goose in front of him, and walks forward.”

The relevant predicates, which are underlined, have the morpheme *qi* (“rise”). Now, remember from section 4.3.2.1 that the meaning of *qi* is not simply “to move up.” Instead, its meaning is “to leave an origin by moving upward.” Thus, the use of *qi* is only felicitous for an event where the figure is initially situated at a location and moves up subsequently. In other words,

a path denoted by *qi* must be a vector with a specific tail. The motion predicates above, therefore, are not exceptions to the principle of spatial anchoring. In fact, the principle correctly predicts that morphemes like *qi* (as well as *jin* (“enter”) and *chu* (“exit”), for that matter) *can* appear without a Dei-P or XP_{-Loc} because their interpretations presuppose a specific position in space. Now, let us turn to the other two cases below:

- (244) yi saó wú rén jiá shì de xiǎo chuán cóng shàng yóu wǎng xià yóu
 one CL no-person drive DE little-boat from upstream toward downstream
piào liú èr xià, tíng kào zài àn biān.
 float and go-down stop get-close be-at bank side [0302MANZM]
 “An unmanned small boat floated from upstream toward downstream and stopped at the riverbank.”

- (245) nǐ yǒu yí gè rén huà zhē chuán
 have one CL person paddle-IMP boat
cóng yuǎn fāng shùn liú èr xià.
 from far side go-along stream and go-down [0303MANZM]
 “There is a person paddling a boat down the stream.”

At first glance, these two cases seem to present a real challenge to the principle of spatial anchoring because it is unclear how the PATHS are anchored. Taking away the subjects, adjunct phrases, and unrelated predicate from these two utterances, let us focus on the predicates most relevant to the problem:

- (246) piào liú èr xià
 float and go-down
 “float and (thereby) move down” [0302MANZM]

- (247) shun liu er **xia**
 go-along stream and **go-down**
 “go with the stream and (thereby) move down” [0303MANZM]

As shown above, both predicates have the “V er V” construction, which has roughly the reading of “do X and (thereby) do Y.” Importantly, this construction is somewhat idiomatic in that one cannot easily change the wording without making it sound awkward. For instance, suppose we add a manner verb and a deictic morpheme to (247), thereby obtaining (248) and (249), respectively:

- (248) ??shun liu er **piao xia**
 go-along stream and **float go-down**
 “go with the stream and (thereby) float down”

- (249) ??shun liu er **xia qu**
 go-along stream and **go-down go**
 “go with the stream and (thereby) go down”

The resulting predicates are quite unnatural, and it is hard to find a structural explanation for it. The most likely explanation is that the construction is a fairly fixed expression with a set of unique constraints regarding its phonology, syntax, wording, etc. It is possible that *xia* in these two instances actually plays the role of a main verb as opposed to a semi-functional range assigner to [Ver<e>]. Alternatively, it may be that an XP-_{Loc} or Dei-P must be omitted in order to satisfy the unique metrical constraints that come with the “V er V” construction. (The fact that instances of this construction are predominantly four syllables long offers a clue.) In any event, it is likely that (244) and (245) are cases of idioms and should not be treated as evidence against our solution.

To conclude, I put forward a variable binding mechanism along with a principle of spatial anchoring as a tentative solution to *the Problem of PATH*. It not only accounts for the problem itself but also explains a number of related observations, including the facts that Dei-P is always structurally lower than the other morpheme in PATH, and that ingressive and egressive morphemes

never co-occur with a horizontal or vertical morpheme. I also showed that my data do not contain cases that can be used as evidence against my proposed solution.

4.6 Some Speculative Remarks on Learnability

How children acquire the constraints of PATH in Mandarin is an interesting question. As previous research has shown, languages such as GSP (Osei-Tutu 2019) and Mayangna (Benedicto and Salomón, 2014) are not subject to the set of constraints associated with *the Problem of PATH*, and they can freely generate motion predicates that encode all three dimensions. Can children learn the Mandarin-specific constraints without negative evidence from the environment? Can they achieve that without unreasonably complex innate learning mechanisms? Though this section obviously cannot fully address this issue, I will nevertheless make some speculative remarks on what the learning environment can offer and what learning mechanisms may be involved.

On the environment's end, there is reason to think children can deduce the existence of the variable *x* in the deictics from available input. The following scenario is not uncommon: An adult is standing ten meters away from an apple tree with his child and says:

- (250) Pingguo diao xia lai le!
Apple fall go-down come PFV
“The apple fell down!”

The child may immediately notice that the apple moved toward the bottom of the tree rather than where her body is physically located. Based on this observation and (probably abundant) prior experiences where the use of *lai* did correspond to something moving toward her body, she may deduce that *lai* (“come”)—and *qu* (“go”) by extension—is somewhat context sensitive and has slightly different interpretations depending on what else is in the sentence or in the discourse context. Her hypothesis may receive support when she hears sentences like the following:

- (251) (Jin) lai wu nei.
(enter) come house inside
“Come inside the house.”

From input like this, where a deictic morpheme merges with an overt XP-_{Loc} that has a particular geometric interpretation (*nei* denoting a positive space, in this case), the child can be more certain that not all deictic centers have to be the physical body of the speaker or whoever serving as the center. Rather, a deictic center is the *position* of someone or something, and that position can take on different shapes or forms.

Incidentally, it should be reiterated that taking the variable *x* away from the meanings of the deictics would not necessarily make acquisition easier, even though it would make the theory simpler on the surface. Recall that without {*x*}, people could potentially come up with many alternative deictic centers or goals for a given event (since they need not be tangible).⁴¹ How, then, could children learn to limit their choices to just a few candidates? Furthermore, always using oneself as a deictic center and mentally projecting to other locations does not seem like an easy task for children. Even if this is the way adults use the deictics, learning it would require children to guess what is going on in an adult speaker's mind when a deictic is used ("Is he imagining himself being at the bottom of the apple tree right now?"). Also, in the case of multiple figures, it would require them to imagine themselves being at multiple locations simultaneously. I find such a mental process psychologically implausible even for adults.

What knowledge and mechanisms does a child's mind need to possess in order to learn from the input, then? In the picture I am trying to paint, pre-linguistic children must be equipped with innate geometric concepts of point, line, plane, and space (positive and negative) at the very least. They also need to know the contrast between up and down as well as near and far without conscious learning. With these early-developed concepts and the later realization that the deictics are context sensitive, children can try to figure out what syntactic context yields what geometric interpretation of a deictic center. This is a mapping task between a closed set of morphemes to a closed set of

⁴¹ This problem is much more severe with *qu* ("go") than with *lai* ("come"). The meaning of *qu*, recall, is *move toward an {x} that is not {the deictic center}*. Without {*x*} and the help from an overt XP-_{Loc}, there would be no restrictions whatsoever on what a goal could be in a motion event denoted by *qu*. But restrictions do exist, and they can be illustrated with the following scenario: Imagine you and your family are cleaning the house. Your mother is telling you to get rid of a pile of old books. If she says (i), she may consider you cooperative as long as the books are no longer in the house; that is, they end up in the negative space around the house. In fact, it is possible that she won't care if you take the books to different dumpsters at different locations. If she says (ii), however, she most likely has a more specific goal in mind, that is, a location specific enough to be conceptualized as a single point—perhaps a particular dumpster. Again, the shape of the goal matters.

i) ba	shu	ban	chu	qu.	ii) ba	shu	ban	guo	qu.
BA	book	move	exit	go	BA	book	move	cross	go
"Take the books out."					"Take the books there."				

geometric concepts, and such a closed-end mapping task can be handled quite well by a general-purpose neural network (Marcus, 2020). Given that variable binding is needed for the Mandarin PATH, children should also be equipped with knowledge about the structural conditions for binding. The proposal thus far, I believe, is not unreasonable.

What is not as clear is whether children are predisposed to think of a path as an anchored vector and how other languages ensure the Event Identification of PATH results in one intersective vector. Since the solution to *the Problem of PATH* proposed in this dissertation hinges on the need for spatial anchoring and an Event Identification enforced by binding, these are crucial questions. Though no answers are currently available, the present work provides a basis for developing testable hypotheses and future research projects.

4.7 Conclusion

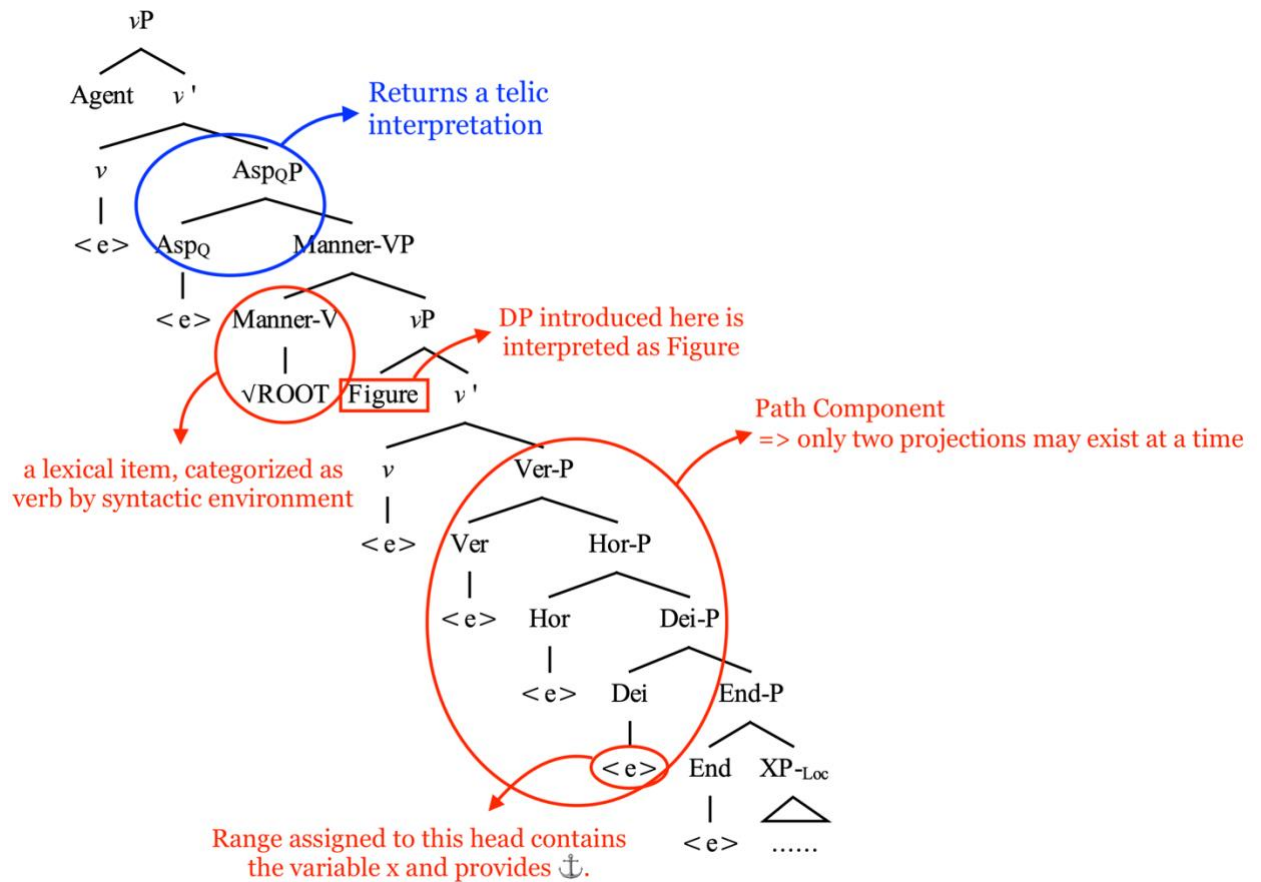
In this chapter I explained what a path is in terms of a vector in the Cartesian coordinate system. Data from the elicitation sessions were examined, and a number of recurring patterns were noted. Specifically, PATH in Mandarin allows two motion morphemes at most, and when there are two, one of them is deictic. This Mandarin-specific constraint, along with the observation that the vertical and horizontal morphemes do not appear without a Dei-P or XP-_{Loc}, became *the Problem of PATH*. After showing that PATH and MANNER are different syntactic components, I proposed a tentative solution to *the Problem of PATH* based on variable binding and the idea of spatial anchoring. Finally, the discussion in section 4.6 suggests that the present approach to the problem is promising from a learnability perspective.

CHAPTER 5. TELICITY

5.1 Introduction

Let us begin by taking a look at what has been covered so far:

(252) Structure of motion predicates



The red circles are parts of the structure that have been discussed so far. This chapter will be focused on telicity, which is an interpretation returned by the functional projection in the blue circle. This functional projection, called AspQP, is responsible for telic interpretation in general. The chapter is organized as follows: First, I shall provide a definition of telicity in section 5.2. Since we are using XSM as our framework, the definition will be the same as provided in Borer (2005b). In section 5.3, we will see the ways in which telicity in general is obtained in syntax and how motion predicates in particular yields telic interpretation. In section 5.3.1 I shall talk in detail about AspQP—which is responsible for returning telic interpretation—and how its empty head is

assigned range. As will be shown in 5.3.2, in motion predicates the empty head of AspQ_P is typically, though not always, assigned range by the verb of arriving *dao* (“arrive”), which originates in the head position of End-P (at the bottom of the structure in (252)) and undergoes head movement from [End<e>] to [AspQ<e>]. I will also show in 5.3.3 that, aside from *dao*, there are other motion morphemes, such as *jin* (“enter”), that can assign range to [AspQ<e>] and give a motion predicate a telic reading. Finally, in section 5.4 I will briefly comment on the apparent double marking in Finnish motion predicates and explain why it does not pose a problem for my argument. The chapter will be concluded in section 5.5.

5.2 What is Telicity?

I follow Borer (2005a, b) in defining telicity as a quantity event. In Chen (2018, forthcoming), that definition is as follows:

(253) X is quantity if X is non-cumulative or non-divisive.

X may be a nominal expression or an event, but since we are dealing with telicity here, let's focus on the latter first and see how the definition above can help us determine whether an event is telic or atelic. Let me begin by elaborating on the terms *non-divisive* and *non-cumulative*. Assume an event of *running ten miles*. Call it E. E cannot be divided into sub-events that are also events of *running ten miles*. Those sub-events could be events of running the first three miles or the last ten meters, but certainly not the whole ten miles. We call this property *non-divisive*, whereby at least one division of the event is different from the whole. Since E has this non-divisive property, it is a quantity (hence telic) event. If there is another event of *running ten miles*—call it E'—, and if we combine E' with E, the resulting event will be one of running twenty miles, not ten miles. This property, whereby cumulation of multiple identical events results in a different event, makes E *non-cumulative*, hence quantity and telic.

Now, consider an event of *running*. Call it R. If we divide R into multiple sub-events, they will all be events of running. Therefore, R is divisive; that is, any division of R will still be an event of *running*. If there is another event of *running*—call it R'—, combining it with R will result in an event that is also one of *running*. Because of this, we call R cumulative. Since R is both

divisive and cumulative⁴², it fails to meet the condition of quantity. In other words, R is non-quantity and thus atelic.

The notion of quantity equally applies to nominal expressions. The referent of the noun phrase *ten miles*, for instance, is non-cumulative because one cannot add another ten miles and still call it *ten miles*, for it should be properly referred to as *twenty miles*. This alone qualifies the phrase *ten miles* as a quantity expression. Moreover, if one divides ten miles into subparts, none of those subparts can be properly referred to as *ten miles*. This non-divisive property, again, makes the noun phrase *ten miles* quantity. In contrast, the phrase *water*, for example, is non-quantity because it is both cumulative and divisive. One can add water to water, and the aggregate can still be properly referred to as *water*. Similarly, we can divide water however we want, but any division of it will still be called *water*⁴³.

5.3 Conditions for Telicity in Motion Predicates

In this section, we will first look at how Borer (2005b) treats telic predicates in general within the Exo-Skeletal Model and then discuss how telic interpretation arises in motion predicates in particular.

5.3.1 The AspQ Projection

Borer's (2005b) treatment of telicity boils down to her proposal of a functional projection called AspQP. Put plainly, a syntactic structure has a telic reading if and only if AspQP is present and assigned range. In English and many other languages, [AspQ<e>] is typically assigned range through specifier-head agreement (recall section 2.4), as illustrated in (254).

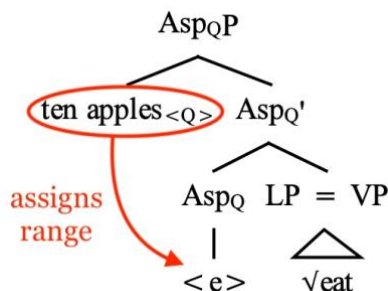
Below is the syntactic structure of the VP *eat ten apples*. The DP *ten apples* is quantity (hence the notation <Q>), and therefore it is able to give the event structure a quantity / telic reading by assigning range to [AspQ<e>] from the specifier position of AspQP. By doing so, the

⁴² Notice that R has to be both divisive *and* cumulative in order to be non-quantity. If R were divisive but non-cumulative, or if it were cumulative but non-divisive, then R would immediately satisfy the requirement for quantity in (253).

⁴³ Surely, we are talking about these things in a way that our common sense (or our naïve physics cognitive module) can intuitively understand. In principle, water could be broken down into oxygen and hydrogen atoms and cease to be water, but that knowledge is acquired through formal education on chemistry and is certainly not part of our intuition. (Indeed, students often have to run experiments to be convinced of this fact about water.) There is little reason to think the grammar of quantity requires anything beyond our naïve intuition.

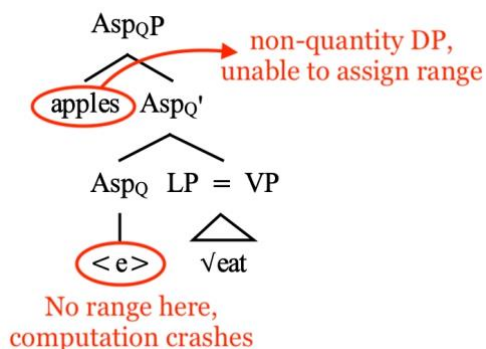
DP *ten apples* receives a Subject-of-Quantity role (S-o-Q). Furthermore, if the event structure has another DP that receives nominative case (from Spec TP, as commonly assumed), the S-o-Q DP will receive accusative case from Spec AspQP.⁴⁴

(254) Range assignment to [AspQ<e>] by way of specifier-head agreement



If a VP has a non-quantity DP instead, no range can be assigned to [AspQ<e>] in the way described above. Take *eat apples* for example. Since *apples* is both cumulative and divisive (hence non-quantity)⁴⁵, it cannot assign range to [AspQ<e>] the way *ten apples* can. In this case, AspQP cannot project without crashing, for there is no element to provide the event with a quantity / telic reading.

(255)

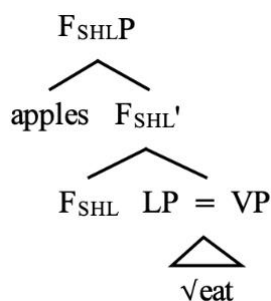


⁴⁴ See Borer (2005b, pp. 79-81) for a detailed exposition. Notice that if the event structure in question does not have any DP other than the S-o-Q (that is, an unaccusative structure), the S-o-Q will move to Spec TP for nominative case, otherwise it would violate Burzio's generalization. For example, if the S-o-Q in the sentence "The vase broke" is to be replaced with a pronoun, that pronoun must be assigned nominative rather than accusative case, i.e., "They broke" rather than "Them broke."

⁴⁵ In XSM, the "plural marker" -s in English is not analyzed as a plural morpheme meaning "more than one." Rather, it is analyzed as a range assigner for the head of a functional projection called CL-P, which turns an otherwise mass noun into a count noun. *Apples*, therefore, does not mean "more than one apple" in this analysis (otherwise it would be non-divisive and thus quantity). Instead, it simply means "an unspecified number of apples that can be counted"—an interpretation that is truly non-quantity. See Borer (2005a) for details of her analysis.

Instead, the DP *apples* is introduced by an empty shell functional projection and receives partitive case⁴⁶, which is distinguishable morphologically from accusative case in languages like Finnish (see Finnish examples in (257) and (258); notice the different case markings and interpretations). In this syntactic configuration, *apples* receives a default Participant role.

(256)



(257) Anne rakensi taloa.

Anne built house-PRT

“Anne was building a/the house.”

(258) Anne rakensi talon.

Anne built house-ACC

“Anne built a/the house.”

Verkuyl (1972, 1989, 1996) made the influential generalization that telic interpretation is tied to the presence of an argument with a certain semantic property. For him, that semantic property is “specified quantity” (Verkuyl, 1972). From the discussion above, we see that this generalization can be re-stated in XSM terminology as follows: telicity arises from the presence of a quantity internal argument. However, while robust, it has been shown over the years that this generalization is too strong. On the one hand, the internal argument is not the only element that can trigger telicity, and not all internal arguments (even if quantity) yield telic interpretations. I will address here the Divided-Event Construction, and in the rest of this chapter I will discuss the case of motion predicates.

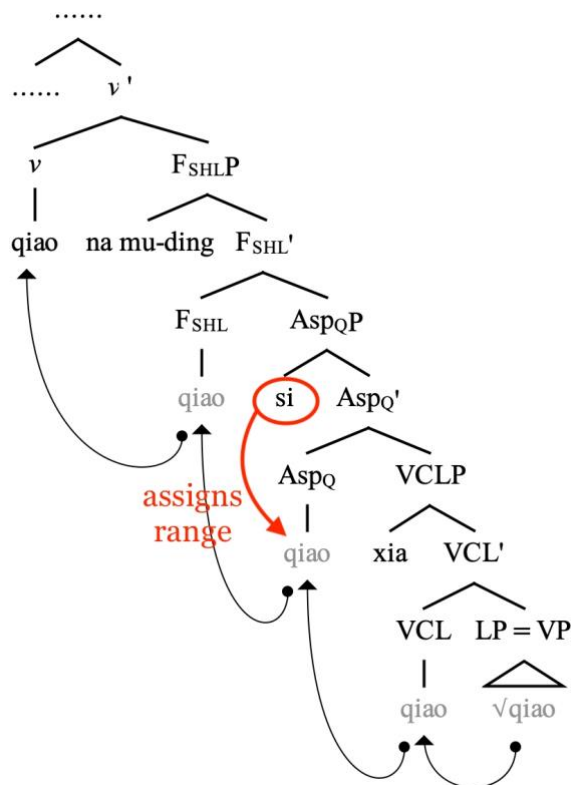
⁴⁶ It is an empty shell because it is semantically vacuous. That is, it does not return a particular interpretation. Being semantically vacuous, its head does not need to be assigned range. All this functional projection does is assign case to the argument it introduces. See Borer (2005b).

In Chen (2018, forthcoming) I argue that a numeral may also assign range to [AspQ<e>] and give rise to telicity. The argument pertains to the following construction, which I call the Divided-Event Construction (DEC):

- (259) (Zai san miao ne) qiao na muding si xia.
 (be-at three second inside) hammer that wood-nail four VCL-time
 “Hammer that wooden nail four times (in three seconds).”

In this instance of DEC, an event of nail-hammering is divided into sub-events by the verbal classifier *xia* (“time”). The number of these sub-events is specified by the numeral *si* (“four”), and the whole event receives a quantity / telic reading. In Chen (2018, forthcoming), I propose the analysis in (260), in which [AspQ<e>] is assigned range by the numeral *si* through specifier-head agreement.

- (260) Tree diagram of sentence (259)



This analysis above leads to the prediction that if there is a quantity internal argument in DEC, it will receive partitive case. The reasoning is as follows: Since *si* (“four”) already assigns range to [AspQ<e>], a quantity internal argument cannot be introduced in the specifier of the accusative-case-assigning projection AspQP. If it were introduced there, the argument would assign range to [AspQ<e>] through specifier-head agreement and receive accusative case (recall our earlier discussion with regard to structures (254), (255), and (256)). But if that happened, [AspQ<e>] would be assigned range twice, and ungrammaticality would ensue. Thus, a quantity internal argument must be introduced by some other functional projection, and the only candidate is the partitive-case-assigning projection F^{SHL}P (recall again the discussion with regard to structure (256) and the Finnish examples (257) and (258)). This prediction turns out to be correct. In sentence (261) from Finnish, a language that distinguishes between partitive and accusative for its objects, the quantity internal argument is marked as partitive rather than accusative. Put simply, in a DEC it is the numeral rather than the internal argument that determines telicity.

In short, telicity stems from the presence of AspQP, whereas atelicity from the lack thereof. The head of AspQP may be assigned range through specifier-head agreement by a quantity internal argument—according to Verkuyl’s generalization—or a numeral as in the case of DEC in Mandarin.

(262) I pushed the cart (for hours).

⁴⁷ I thank Angela Bartens for providing the Finnish sentence and Kwaku Osei-Tutu for consulting her on my behalf.

by its compatibility with the temporal adverbial phrase *for hours*. There is no part of this event that is not also an event of cart pushing (hence divisive), and combining it with another identical event will still result in a cart-pushing event (thus cumulative). Once an endpoint is introduced into the motion event, however, telicity arises:

(263) I pushed the cart to New York (in two weeks).

This widely known observation has led to different formal analyses. Ramchand (2008), for instance, proposes that telicity arises from either a projection that denotes a bounded path or one that denotes a result state (p. 109). Ramchand's framework has been adopted by Zheng (2015) in her analysis of Mandarin and two other Chinese languages (although unlike Ramchand, she treats telic and resultative structures separately). Borer (2005b), on the other hand, maintains that AspQP is the only projection needed for telicity. It is just that its empty head is not assigned range by a quantity internal argument but by a functional element that denotes the reaching of an endpoint. (In my analysis, this functional element also gives rise to the projection of End-P by assigning range to [End<e>]. Previous research used different terms for this projection, such as VP_{reach} in Osei-Tutu (2019) and Taherkhani (2019), but they essentially refer to the same thing. See structure (252) for the position of End-P.) A problem for Borer, however, is that it is not clear why double marking (i.e., assigning range to the same empty head twice) does not happen in motion predicates (Borer 2005b, pp. 209-213). That is, why is it that a quantity internal argument (e.g., *the cart* in sentence (263)) does not compete with an endpoint functional element (e.g., the preposition *to* in (263)) for the same head, namely, [AspQ<e>]? Put differently, what prevents a quantity internal argument from becoming a Subject of Quantity in Spec AspQP?

5.3.2 Verb of ARRIVING

Putting aside the question above and anticipating a brief explanation in section 5.4, let us make the following hypothesis:

(264) When properly assigned range, AspQP yields telicity for motion predicates just as it does for any other kind of predicate. In Mandarin motion predicates, [AspQ<e>] is typically, though not exclusively, assigned range by a semi-grammaticalized verb of ARRIVING—such as *dao*

(“arrive”)—through head movement from the verb’s original position, [End<e>], to [AspQ<e>].

This hypothesis is supported by two pieces of evidence: the behavior of DEC predicates and the behavior of *dao* with respect to the perfective marker *-le*.

First, our hypothesis predicts that *dao* will not be compatible with DEC because, as mentioned above, DEC already has a numeral assigning range to [AspQ<e>]. Having *dao* in the structure would then result in double marking. The prediction is correct. Consider the following video prompt and sentences, with relevant elements in bold:

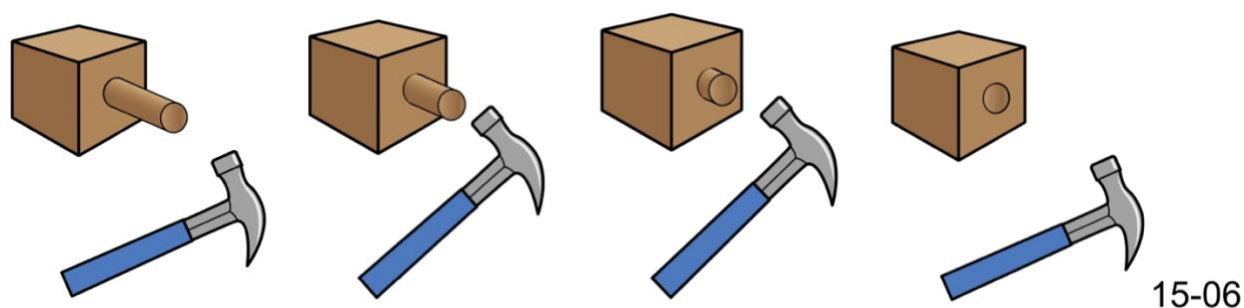


Figure 5.1: Prompt 15-6, depicting a nail being hammered into a cube

- (265) Muding bei qiao **dao** fangkuai li.
 Wood-nail BEI hammer **arrive** cube inside
 “The wooden nail was hammered **into** the cube.”

- (266) Muding bei qiao **si** xia.
 Wood-nail BEI hammer **four** VCL-time
 “The wooden nail was hammered **four** times.”

- (267) *Muding bei qiao **si** xia **dao** fangkuai li.
 Wood-nail BEI hammer **four** VCL-time **arrive** cube inside
 “The wooden nail was hammered **four** times **into** the cube”

Interestingly, from a purely semantic / conceptual perspective, sentences (265) and (266), though perfectly licit, only describe certain aspects of the event. In contrast, sentence (267), which

is in fact more accurate and detailed in its description, is the one that is unacceptable. This curious fact receives an explanation if *dao* is, as we hypothesized, able to assign range to [AspQ<e>], hence in competition with the numeral *si*.

Incidentally, one participant produced sentence (268) in response to Figure 5.1. From her repeated use of the verb *qiao* (“hammer”), we can tell she split the event into two: one of hammering the wooden nail several times, the other of hammering it into the cube. The reason for the split is clear: The first predicate is a DEC, which has a quantity expression *ji* (“several”) assign range to [AspQ<e>]. The second predicate is a motion predicate, in which the ingressive morpheme *jin* (“enter”) assigns range to [AspQ<e>]. (Since *jin* roughly means “arrive inside of something,” it stands to reason that it can give rise to telicity just as *dao* can.) Combining the two into one predicate would have resulted in double marking.

(268) yi ge tu chu zai fangkuai shang de muding
 one CL protrude exit be-at cube top DE wood-nail

 bei chuizi qiao-le **ji** xia,
 BEI hammer (n.) hammer (v.)-PFV **several** VCL-time

 qiao **jin** na ge fangkuai zhi zhong.
 hammer (v.) **enter** that CL cube GEN center [1506MANS]

“A protruding wooden nail on the cube was hammered **several** times by the hammer, (and it was) hammered **into** that cube.”

Another prediction we can make based on our hypothesis in (264) is that if a verb or morpheme is in a head position between [AspQ<e>] and *dao* (“arrive”), it will form a complex head with *dao*. The reason is as follows: As hypothesized, *dao* assigns range to [AspQ<e>] by moving to the empty head of AspQP. When *dao* undergoes head movement from End to AspQ, it must go through all the intermediate head(s), otherwise it would violate the Head Movement Constraint. If a morpheme already occupies an intermediate head, say, a Manner-V, *dao* must form a complex head with that morpheme before moving further up.

We can verify this prediction by looking at the kind of head that linearly precedes the aspect marker *-le*. If *dao* really forms a complex head with an intermediate head before landing in Asp_Q , then what *-le* takes up to Asp will be a complex head, as illustrated in (269). On the other hand, if *dao* stays in End and never moves to Asp_Q , then *-le* should only take up whatever head that is structurally closest to it because that is what the probe will see first, as illustrated in (270):

(269) [AspP $\text{V}_{\text{MANNER-dao-le}}$... [Asp-QP $\text{V}_{\text{MANNER-dao}}$ [Manner-VP $\text{V}_{\text{MANNER-dao}}$... [End-P *dao*]]]]

(270) [AspP $\text{V}_{\text{MANNER-le}}$... [Asp-QP V_{MANNER} [Manner-VP V_{MANNER} ... [End-P *dao*]]]]

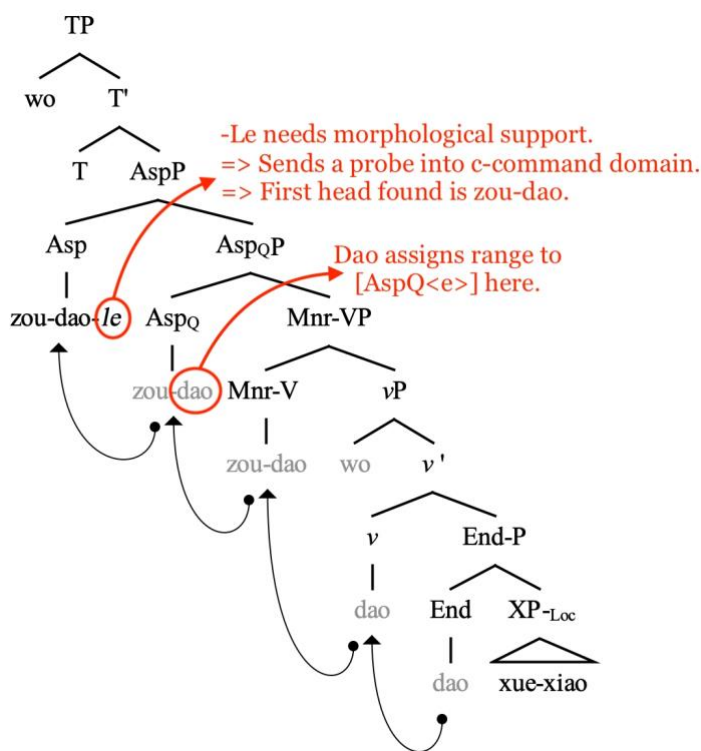
Our prediction is borne out. Sentence (271) and its derivation in (272) show that if there is a Manner-V between Asp_Q and End , *dao* and the Manner-V will form a complex head, which will eventually be taken up by *-le* for morphological support.

(271) Wo zou dao-le xuexiao

1st walk arrive-PFV school

‘‘I have walked to the school.’’

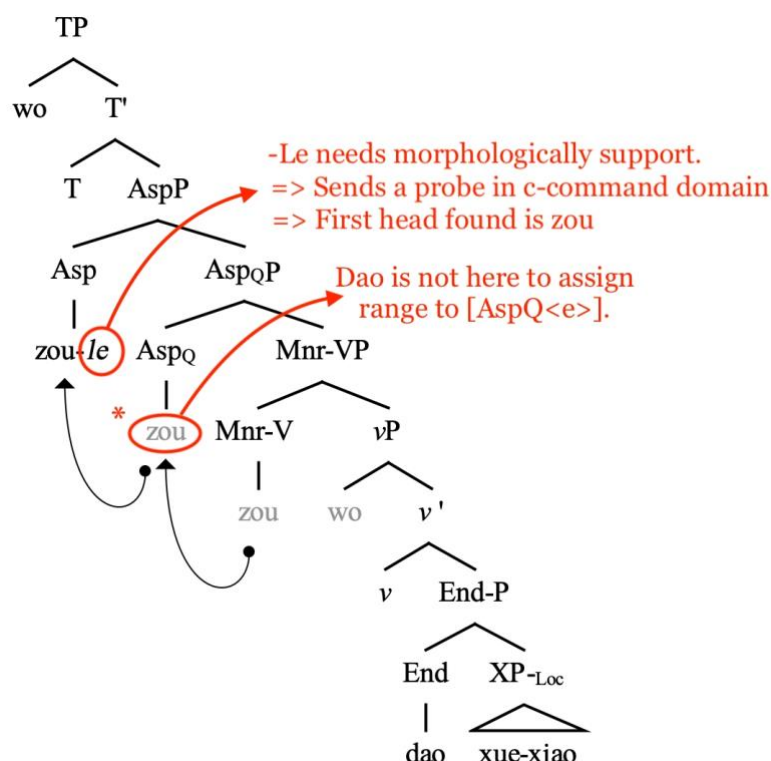
(272)



In contrast, sentence (273), in which *dao* stays in End and does not form a complex head with the Manner-V, is not acceptable. Because *dao* does not undergo head movement, *-le* can only take whatever element that is structurally closest to it, and in this case, it is the Manner-V *zou*. We can see from the derivation in (274) that [AspQ<e>] does not receive the range it needs from *dao*, and that the computation crashes as a result.

- (273) *Wo zou-le dao xuexiao
 1st walk-PFV arrive school
 “I have walked to the school.”

(274)



Importantly, in the last chapter we saw an example of the aspect marker *-le* taking only part of a verb series as its stem. This example and the derivation of it are reproduced below, along with the video prompt that elicited it. Since this sentence was in response to an atelic prompt, we can safely assume that no AspQP projects in (276):

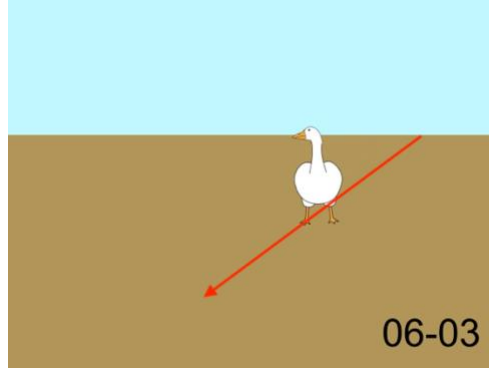


Figure 5.2: Atelic motion event denoted by prompt 6-3

- (275) yi zhi e zou-le guo lai.
 one CL goose walk-PFV cross come [0603MANSD]
 “A goose has walked over here.”

- (276) [TP yi zhi e [AspP ZOU-le [MANNER-VP ZOU [vP [v guo-lai [Hor-P.....]]]]]]

This example shows that there is no requirement for *-le* to take a verb series in its c-command domain as a whole. Thus, (273) is ungrammatical not because a verb series has been broken, but because [AspQ<e>] fails to be assigned range.

If the analysis above is on the right track, we can further predict that *dao* will form a complex head with motion morphemes in PATH—if there are any—on its way to AspQ. This is because End-P is structurally lower than PATH, which in turn is lower than MANNER as well as AspQ, and because *dao* cannot violate the Head Movement Constraint by skipping over the head(s) in PATH and moving directly to AspQ. The prediction is borne out:

- (277) [TP Ta [Asp lai-dao-le [Asp-QP lai-dao [vP lai-dao [Dei-P lai-dao [End-P dao [XP-Loc xuexiao]]]]]]]]

- (278) Ta lai dao-le xuexiao.⁴⁸
 3rd come arrive-PFV school
 “S/he has come to school.”

⁴⁸ I assume MANNER in this sentence is altogether absent, and that *lai-dao* is categorized as a verbal complex by merging with AspQ (or alternatively, by merging with the *v* that introduces the Figure).

Again, for the same reason we ruled out (273), sentence (280) is not acceptable because [AspQ<e>] is not assigned range by *dao*. Without *dao* moving from End to AspQ, the structurally closest head to *-le* is *lai*, which consequently ends up in Asp:

(279) *[TP Ta [Asp lai-*le* [Asp-QP lai [vP lai [Dei-P lai [End-P dao [XP-Loc xuexiao]]]]]]]

(280) *Ta lai-*le* dao xuexiao.
 3rd come-PFV arrive home
 “S/he has come to school.”

Based on the two pieces of evidence from the behavior of DEC predicates and the behavior of *dao* with respect to the perfective marker *-le*, we have confirmed our hypothesis that a verb of ARRIVING, e.g., *dao*, assigns range to [AspQ<e>] in motion predicates. This is in line with Borer’s (2005b) proposal and previous research on telic motion predicates in GSP (Osei-Tutu, 2019) and Tati (Taherkhani, 2019). Furthermore, evidence suggests that *dao* undergoes head movement from End to AspQ in order to assign range. This may be a language-specific process, as GSP and Tati do not employ head movement for this purpose (Osei-Tutu 2019, Taherkhani 2019), at least not overtly.

5.3.3 Range Assigners Other Than *Dao*

It should be noted that a semi-grammaticalized verb of ARRIVING is not the only element that can assign range to [AspQ<e>] and give rise to telicity in motion predicates. Put differently, motion telicity is not restricted to the existence of an endpoint, at which a Figure stops moving completely. Indeed, the definition of quantity / telicity adopted here makes no reference to having an end to an event—not literally or metaphorically. (In her work, Borer (2005b, pp. 222-223) makes a similar comment on sentences like “The boat floated under the bridge in two hours.”) All it makes reference to are the notions of cumulativity and divisivity. Others have remarked on cases that do not have an end but seem to obtain a telic interpretation nonetheless. In his analysis of GSP, Osei-Tutu (2019, pp.111-114) noticed cases where participants of his study seemed to conceptualize the beginning of an event of flying off—i.e., the moment when a Figure lifts itself off the ground—as, in my words, a source of quantity interpretation. In such cases, no visible endpoint was in

sight—thus no V_{REACH} (his equivalent of End) in the syntactic structure—, and yet the utterances the participants produced had a sense of culmination typically associated with telic events.

Within the system being developed here, there is no relation between AspQ and End other than the fact that whatever assigns range to the latter also assigns range to the former and thereby prevents the derivation from crashing. The absence of End only means that [AspQ<e>] must now seek range from some other linguistic element if a telic reading is to be maintained. Under this view, the “flying off” cases in GSP may have been truly telic, and the sense of culmination came not from an endpoint but from the fact that a flying-off event must consist of a sub-event where the Figure is in contact with the ground and another one where the Figure is in the air—a perfect example of a non-divisive, hence quantity, event. (But see Osei-Tutu (2019, p. 113) for his own analysis, in which the sense of culmination is attributed to an outer perfective aspect.)

In this section, I will talk about some of the candidates that can give motion predicates a telic reading. For each candidate I will provide evidence that the element in question can render a motion predicate telic.

5.3.3.1 *Zhi* (“Arrive”)

The morpheme *zhi* is found in a few instances in our data. It is semantically equivalent to *dao* (“arrive”), but it has completely lost its status as a verb (Lin, 2019). In XSM terms, *zhi* is a completely functional range assigner, not a root. Unlike its semi-grammaticalized counterpart *dao*, it cannot be categorized as a verb by its syntactic environment, as illustrated by the example below:

- (281) *Wo zhi-le xuexiao.
 1st arrive-PFV school
 “I have arrived at school.”

Aside from its functional status, *zhi* is essentially no different from *dao* in that it also gives a motion event a reading of having an endpoint. It stands to reason that *zhi*, just like *dao*, is able to

serve as head of End-P and assign range to [AspQ<e>].⁴⁹ Below is an example from the data that corresponds to a telic prompt:

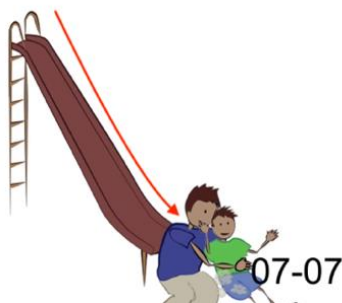


Figure 5.3: Prompt 7-7

- (282) yi ge daren jiang yi ge xiaohai cong liuhuati de shang fang
 one CL adult JIANG one CL child cong slide (n.) GEN up side
 hua zhi liuhuati de xia fang.
 slide (v.) arrive slide GEN down side [0707MANSD]
 “An adult slides a child from the top of the slide to the bottom of the slide.”

5.3.3.2 *Jin* / *Ru* (“Enter”) and *Chu* (“Exit”)

Our data include many utterances corresponding to telic prompts that depict ingressive motion events. The motion predicates in these utterances typically have *jin* or *ru* in their PATH components. See sentence (283) for an example that corresponds to the telic prompt 10-02.

- (283) Yi ke qiu fei **ru**-le qiumen nei.
 One CL ball fly **enter**-PFV ball-gate inside [1002MANZM]
 “A ball flew into the gate.”

⁴⁹ This can be tested quite easily. Try having *dao* and *zhi* in the same predicate, and you get an ungrammatical result. Presumably, this is due to the competition between *dao* and *zhi*, both of which assign range to [End<e>] and [AspQ<e>].

i) *Wo zou dao zhi xuexiao.
 1st walk arrive arrive school
 “I walk to school.”

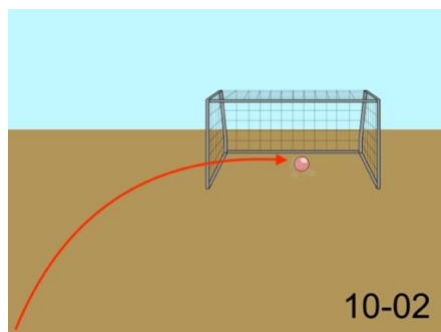


Figure 5.4: Prompt 10-2

Both *jin* and *ru* mean “enter,” but the latter is more grammaticalized than the former. Unlike *jin*, *ru* does not normally appear alone in a motion predicate, at least not without sounding archaic. See (284), and also see Lin (2019, p. 15) for the same observation.

- (284) ??Yi ke qiu **ru**-le qiumen nei.
 One CL ball **enter**-PFV ball-gate inside
 “A ball entered the gate.”

It is important to point out that entering a space does not necessarily mean the Figure has reached an endpoint. It is entirely possible, for instance, that a girl has “entered” a pond by submerging in the water but is still in the process of sinking down toward the bottom. (Indeed, in Chapter 4 we saw that the participants would still use an ingressive morpheme even when the prompt ended with only one of the girl’s feet in water.) In other words, the existence of an endpoint is irrelevant to ingressive motion predicates. But even without an endpoint, the fact that an ingressive event must consist of a sub-event where the Figure is outside a space and another where the Figure is inside already tells us the event has to be non-divisive, hence quantity. It should be telic according to our definition of telicity.

A test can corroborate this conclusion. Imagine someone hammering a peg four times in a row. By the end of the second time, every part of the peg is completely inside a cube, but the hammer can still hit it and make it go even deeper inside. By the end of the fourth time, there is still room inside the cube, and the peg could go deeper still if the hammering resumed. Now, suppose we were wrong, and that telicity hinged on there being an endpoint. If so, the peg entering the cube would not make the event telic because it kept going deeper after the entering had taken

place. We would then expect the following sentence to be acceptable because the ingressive morpheme *jin* would not compete with the numeral *si* (“four”) to assign range to [AspQ<e>] (recall our discussion in the last section on how numerals contribute to telicity in the Divided-Event Construction):

- (285) *Muding bei qiao **si** xia **jin** fangkuai li.
 Wood-nail BEI hammer **four** VCL-time **enter** cube inside
 “The wooden nail was hammered **four** times **into** the cube”

Contrary to the prediction of this alternative, the sentence *is* unacceptable even with the scenario given above. Thus, we have reason to think that the ingressive morpheme *jin* assigns range to [AspQ<e>]⁵⁰.

If *jin* and *ru* can give rise to telicity, it stands to reason that the opposite motion, *chu* (“exit”), can do the same. An egressive event must involve a sub-event where the Figure is inside a space and another one where it is not. Neither of those sub-events is the same as the whole event, which means the whole event is non-divisive, hence quantity. It is thus not surprising that an egressive predicate is compatible with *zai X nei* (in X time) phrases⁵¹:

- (286) Laoshu zai san fenzhong nei jiu zou *(**chu**)-le migong.
 Mouse be-at three minute inside then walk *(**exit**)-PFV maze
 “The mouse found its way out of the maze in three minutes.”

Now, did the mouse stop or keep moving after it exited the maze? We will never know from this sentence alone because, again, telicity as defined in terms of cumulativity and divisivity does not entail the existence of an endpoint at which motion terminates.

⁵⁰ Also see sentence (268) in the last section, where the participant uses two separate predicates so that the ingressive morpheme does not compete with a quantity expression.

⁵¹ Application of the *zai X nei* test can be found in previous works on Mandarin, such as Huang (2014). Notice that the test can reliably rule out non-quantity events:

i) Wo zai yi tian ne kan *(wu ben) shu
 1st be-at one day inside read *(five CL) book
 “I read *(five) books in one day.”

5.3.3.3 *Guo* (“crossing”)

The data presented in Chapter 4 revealed an interesting pattern. That is, the morpheme *guo* (“cross”) may take an XP_{-Loc} as its complement, resulting in a reading of boundary crossing. It is easy to see why such a reading must be quantity. Crossing a boundary involves at least two stages: being on one side of the boundary initially and being on the other side later. Neither of those stages can be referred to as crossing the boundary. Thus, a predicate with the structure [*guo* [XP_{-Loc}]] is telic, supported by the fact that it is compatible with a *zai X nei* phrase (see below). And since the presence of *guo* makes an otherwise atelic predicate telic, it stands to reason that it is the one assigning range to [AspQ<e>].

- (287) Xiaoniao zai san miao nei fei *(**guo** hei).
 Small-bird be-at three second inside fly *(**cross** river)
 “The birdie flew across the river in three seconds.”

Importantly, many of the utterances we saw earlier in Chapter 4 that have the [*guo* [XP_{-Loc}]] pattern correspond to prompts in which the Figures do not reach an endpoint. What they have in common is a Figure being on one side of a boundary initially and on the other side subsequently. Take prompt 02-11 below for example. Although there is no endpoint in this prompt, it is still acceptable to add the parenthesized *zai X nei* phrase to the corresponding utterance in (70), suggesting that termination of motion does not always play a role in telicity.

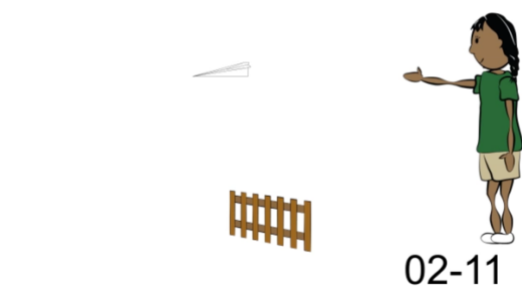


Figure 5.5: Prompt 2-11

- (288) you yi ge xiaohai jiang zhifeiji (zai san miao nei)
 have one CL child JIANG paper-plane (be-at three second inside)

she guo-le zhalan.

shoot cross-PFV fence

[0211MANZM]

“There was a child who threw a paper plane across the fence (in three seconds).”

5.3.3.4 *Shang* (“Get Onto”)

In the data presented in Chapter 4, we saw sentences in which the morpheme *shang* means “get onto the surface of something” rather than “go up.” It seems that those instances of *shang* do not function as range assigners to [Ver<e>]. Below is one example corresponding to a telic prompt:



Figure 5.6: Prompt 11-3

(289) Daren ba xiaohai cong di shang bao shang zhuo.

Adult BA child cong ground top hug get-onto table

[1103MANCT-2]

“The adult moved the child from the ground onto the table by holding him.”

Just as with ingressive, egressive, and boundary-crossing events, it is not difficult to see how sentence (289) denotes a quantity event. The sentence accurately describes prompt 1103, but it certainly cannot be a description of any sub-event that happens before the child actually hits the surface of the table. One can consider, for example, the sub-event that spans from the moment when the child is lifted off the floor to the moment when he is still five centimeters below the tabletop. That sub-event obviously cannot be denoted by (289), which makes the whole event non-divisive. Therefore, it stands to reason that there is an AspQP in the structure, and that its empty head is assigned range by *shang* (“get-onto”). This conclusion is bolstered by the fact that the use

of the temporal expression *zai san miao nei* in sentence (290) below is only acceptable when *shang* is present, suggesting that the telic reading of the sentence hinges on the morpheme *shang*.

- (290) E zai san miao ne jiu zuo *(shang)-le yuan pen.
 Goose be-at three second inside then walk *(get-onto)-PFV round basin
 “The goose walked onto the round basin in three seconds.”

5.4 Quantity Internal Arguments in Motion Predicates and Case Markings in Finnish

Although this dissertation is about Mandarin, the claim that [AspQ<e>] is not assigned range by a quantity internal argument in motion predicates should apply across languages. Thus, we need to address a question that has theoretical implications but has not been fully addressed in previous research⁵²: That is, in telic motion predicates, what prevents a quantity internal argument from assigning range to [AspQ<e>] and becoming a Subject of Quantity, given that different case markings in Finnish seem to suggest it occupies the specifier of AspQP? To illustrate:

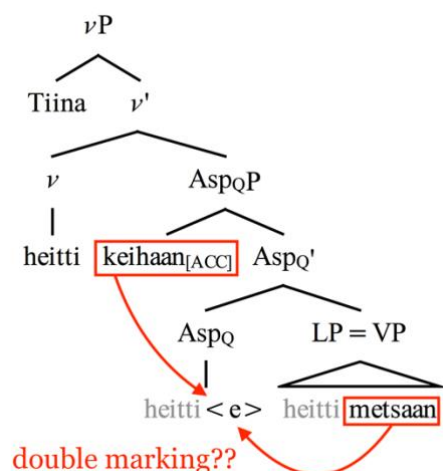
- (291) Tiina heitti keihaan metsaan.
 Tiina threw javelin.ACC into-the-forest
 “Tiina threw the javelin into the forest.” (Borer 2005b, p. 210)
- (292) Tiina heitti keihasta.
 Tiina threw javelin.PRT
 “Tiina threw the javelin.” (Borer 2005b, p. 210)

Specifically, the different case markings suggest that the internal argument of a telic motion predicate is in Spec AspQP position (where it will get accusative case), whereas the internal argument of an atelic motion predicate is in Spec F^{SHL}P position (where it will get partitive case). But recall from section 5.3.1 that a quantity internal argument in Spec AspQP can assign range to [AspQ<e>] through specifier-head agreement and thereby receive a Subject-of-Quantity interpretation. If true, why doesn't double marking (i.e., a functional head being assigned range

⁵² See Borer (2005b, pp. 209-213) for her discussion regarding this question.

twice, in this case, by a quantity internal argument and a functional element denoting the arrival at an endpoint) occur in (291), as (293) illustrates?

(293) Structure of (291)



An answer is readily available if we look back at the structure of motion predicates shown at the beginning of this chapter (see (252)). There, we see that the internal argument of a motion predicate, i.e., the Figure, is in fact introduced by the ν P situated immediately below Manner-VP, not by AspQP or F^{SHLP} . Now, suppose this ν P, just like its Agentive counterpart at the top of structure (252), does not assign case. The internal argument introduced by it would have to receive case through agree from the closest case-assigning projection above. If the predicate is telic, AspQP would assign accusative case to this internal argument; if the predicate is atelic, then F^{SHLP} will assign partitive case. Since case is assigned though AGREE, a quantity internal argument in a telic motion predicate need not move to Spec AspQP from Spec ν P, and therefore range assignment to [AspQ<e>] through specifier-head agreement will not happen. [AspQ<e>], then, will only be assigned range once by a verb of ARRIVING or some other element.

For the sake of argument, even if a quantity internal argument moves to Spec AspQP, there is still a good reason why it cannot assign range to [AspQ<e>] through specifier-head agreement. If it did, it would receive the interpretation of a Subject of Quantity (again, recall our discussion at the beginning of section 5.3.1), which is impossible for a DP that already has the interpretation of a Figure. This point is in line with the idea that Figure and S-o-Q represent two very different conceptualizations of an entity. A Figure is, in Pinker's words (1989, citing Talmy 1983), "conceived as a pointlike or dimensionless entity. (p. 78)" Put differently, a Figure is thought of

as a point in a Cartesian Coordinate System, with no discernible internal structure. In contrast, it is highly unlikely that a Subject of Quantity is conceived as such, given the role it plays in determining telicity in incremental creation / consumption events, such as *eating half an apple in ten seconds and eating all of it in twenty seconds*. (What would half of a dimensionless, point-like entity look like?) I will stop the discussion here, leaving this issue to future research on the interplay between grammar and spatial conceptualization.

In sum, the quantity internal argument of a motion predicate is introduced by a ν P immediately below Manner-VP and is interpreted as a Figure, as proposed by the present dissertation and several previous works, including Benedicto et al. (2019), Osei-Tutu (2019), and Taherkhani (2019). (Also see Acedo-Matellán and Mateu (2014, p. 17), who place Figure in the specifier of a functional projection structurally equivalent to our ν P.) Through agree, the argument receives either accusative case from AspQ_P or partitive case from F^{SHLP} without moving to the specifier of the case-assigning projection. Double marking of [AspQ<e>] does not occur, as the quantity internal argument is not in a specifier-head relation with it.

5.5 Conclusion

In this chapter, I showed that telicity is linked to the presence of a functional projection called AspQ_P, following Borer (2005b). In motion predicates, the empty head of AspQ_P is typically—though not exclusively—assigned range by a verb of ARRIVING, *dao*. Specifically, *dao* must undergo head movement in order to assign range, evidenced by its interaction with the perfective marker *-le*. Aside from *dao*, I suggested there are other range assigners to [AspQ<e>], such as *jin* (“enter”), and provided reasons for this possibility. Finally, I made some brief remarks regarding case marking in Finnish motion predicates and, in doing so, re-confirmed the previous proposal that the internal argument of a motion predicate is introduced by a ν P, not by an AspQ_P or a F^{SHLP} (Benedicto and Salomón 2014, Osei-Tutu 2019, Taherkhani 2019).

CHAPTER 6. CONCLUSION

6.1 Wrapping Up

This dissertation aimed to provide a generative-constructionist syntactic analysis of motion predicates in Taiwan Mandarin and thereby contribute to a growing body of research on syntactic representations of motion events, especially in languages that have Serial Verb Constructions. Using the Exo-Skeletal Model as a framework, the present work accomplished the task by focusing on two major aspects: The first aspect concerns the internal structure of the PATH component—realized as projections headed by (semi-grammaticalized) verbal motion morphemes that describe a vector in relation to the three axes of a Cartesian coordinate system—as well as the Mandarin-specific constraints on the distribution and ordering of these morphemes. The second aspect concerns the way in which telicity obtains in motion predicates.

With respect to the internal structure of PATH, the present study found the same syntactic patterns as those discovered in earlier research on Mandarin motion predicates. Specifically, out of the three dimensions of horizontal, vertical, and deictic, PATH can only simultaneously encode two at most. Moreover, when there are two dimensions encoded, one of them must be deictic. This dissertation took one step further by providing an explanatory account for these patterns. Building upon the Cartesian conceptualization of the path originally proposed by Benedicto and Salomón (2014), I examined the data systematically gathered with a computer-animated instrument and showed how the horizontal, vertical, and deictic dimensions of a coordinate system map onto the PATH component syntactically. Confirming the findings of Zheng (2015) and Chen (2017), the data showed that PATH in Mandarin must not encode more than two dimensions at a time, and that if a PATH encodes two dimensions, one of them must be deictic. Furthermore, while there are plenty of instances in our data where a deictic morpheme appears by itself, there are zero non-idiomatic instances of a horizontal (i.e., *guo* (“cross”)) or vertical (specifically, *shang* (“go-up”) or *xia* (“go-down”)) morpheme appearing without a Dei-P or a referential XP-_{Loc}. (It is worth reiterating that an XP-_{Loc} may be interpreted as a boundary, a surface via which the figure moves, or a potential goal, depending on whether it merges with a horizontal, vertical, or deictic morpheme, respectively.) To go beyond mere descriptions of these syntactic patterns and restrictions, I proposed a tentative but explanatory account based on two original ideas: First, in the denotation

of a deictic, there is a variable x that can yield different geometric interpretations—such as a point, a horizontal plane (i.e., a level), or a space—depending on what motion morpheme binds it. Second, a PATH in Mandarin must denote a vector that is spatially anchored in the sense that it can be described in relation to some referential location. These two original ideas not only successfully rule out predicates with more than two motion morphemes (because one variable cannot be bound twice and assigned two different interpretations) but also explain the absence of instances of a horizontal or vertical morpheme appearing without a Dei-P or referential XP-Loc (because Dei-P's and referential XP-Loc's can anchor a PATH). Aside from explaining the syntactic patterns and constraints of PATH, the binding mechanism and the requirement of spatial anchoring also made several novel predictions that were borne out, including, for example, the facts that an ingressive or egressive morpheme cannot co-occur with a vertical or horizontal morpheme in the same PATH, and that Dei-P is always structurally lower than Hor-P and Ver-P. The explanatory account offered in this dissertation is significant because no previous studies on Mandarin motion predicates have attempted to explain the aforementioned patterns and constraints. Furthermore, given that some languages do encode more than two dimensions in one predicate, it is not obvious how Mandarin-speaking children learn not to over-generate. The present work has provided a starting point for future research on this topic.

With respect to telicity in motion predicates, this dissertation made the following contributions. First, it confirmed the finding of previous research that having a quantity internal argument does not result in telicity. Put in XSM terminology, the functional head that is responsible for telicity in general, i.e., [AspQ<e>], is not assigned range by a quantity internal argument in motion predicates; rather, it is typically (though not exclusively) assigned range by a semi-functional element that originally occupies [End<e>] and denotes the reaching of an endpoint. This is evidenced by the fact that such a functional element—e.g., *dao* (“arrive”) in Mandarin—is barred from a Divided-Event Construction sentence, where there is already a numeral or quantity expression that can assign range to [AspQ<e>]. I also showed that in Mandarin, *dao* assigns range to [AspQ<e>] by undergoing head movement from End to AspQ. This is evidenced by the fact that when there is an intermediate head between End and AspQ, the outer aspect marker *-le* will always take *dao* as part of a complex head, instead of simply taking the head that is structurally higher than *dao* and closest to Asp, where *-le* is located. The second contribution this dissertation made is pointing out a number of Mandarin motion morphemes beside *dao* that can also give rise to

telicity. While some previous studies were focused on motion events that have an endpoint at which motion terminates, the present work drew attention to events with no endpoints and explained how telicity could still arise in those cases.

6.2 Areas for Future Research

A study on motion predicates is essentially a study on the interfaces between language, space, and motion, each of which is highly complex in its own right. It is therefore impossible for the present dissertation to cover all aspects of the topic. While this work answered a few questions left by previous research, it, too, left a number of questions open and raised several new ones that must await future inquiry. To begin with, we must ask to what extent the different syntactic patterns of PATH that have been found in different languages can be explained by the binding mechanism and the notion of spatial anchoring. It would also be interesting to know whether or not the binding mechanism (if it can be found in other languages) has anything to do with the Event Identification of PATH. Answering these questions is not an easy task, and a two-pronged approach will be necessary. On the one hand, we must find out what kinds of motion predicates are possible in a language; on the other hand, we must also find out what spatial and geometric features constitute the interpretations of those possible predicates. Another question we can dive deeper into is how the presence of multiple Figures affects a motion predicate in terms of its interpretation. Although the present study discussed a number of such cases, there are many other cases that deserve attention, too, especially those cases that involve multiple non-specific Figures. Finally, this study did not discuss the agentive component of motion predicates. Therefore, how Mandarin grammatically distinguishes initial and continuous contact—an important parameter of the prompts—will have to be addressed in the future.

APPENDIX A. DATA

Utterances in Response to Horizontal-Only Prompts

Relevant clauses are underlined. *Relevant morphemes are bolded and italicized.*

6 utterances with only *guo*

(1) yi zhi niao zhan zai he de yi bian de shu, fei *guo* he,
one CL bird stand be-at river DE one side DE tree, fly *cross* river

wang lingwai yi bian de shu fei guo qu.
toward other one side DE tree fly cross go [0108MANCT]

“A bird is standing on a tree on one side of the river. (It) flies *across* the river. (It) flies over toward the tree on the other side.”

(2) you yi zhi niao, yi ge chuan luse de yifu de nuhaizi,
have one CL bird one CL wear green DE clothes DE girl

jiang zhe zhi niao diu guo qu, diu *guo* yi tiao lu,
JIANG this CL bird throw cross go throw *cross* one CL road

diu dao yi ge liba na bian.
throw arrive one CL fence that side [0113MANCT]

“There is a bird (and) a girl wearing a green shirt. (She) throws this bird over, throws (it) *across* a road, throws (it) to a fence.”

(3) yi ge xiaohai ba yi zhi niao yefang,
one CL child BA one CL bird release

rang ta fei *guo* he dao zhalan chu.
let 3rd fly *cross* river arrive fence location [0113MANZM]

“A child releases a bird, (and he) lets it fly *across* the river to where the fence is.”

(4) yi ge nuhaizi zhan zai yi tiao he de yi bian,
one CL girl stand be-at one CL river DE one side

jiang ta shou shang de yi zhi niao fangxing,
JIANG 3rd hand top DE one CL bird release

rang niao fei *guo* na tiao he,
let bird fly *cross* that CL river

zhanli zai qian fang de zhalan shang mian
stand be at front direction DE fence top face [0114MANCT]

“A girl is standing on one side of a river. (She) releases a bird in her hands, (and she) lets the bird fly *over* that river and stand on the fence in front of it.”

(5) you yi ge xiaohai jiang zhifeiji she *guo* le zhalan.
have one CL child JIANG paper plane shoot *cross* PFV fence [0211MANZM]

“There is a child throwing a paper plane *over* the fence.”

(6) yi ge chuan luse yifu de nuhaizi,
one CL wear green clothes DE girl

ba shou shang zhifeiji diu chu qu. Zhe feiji chuan *guo* liba
BA hand top paper plane throw exit go this plane go-through *cross* fence

fei dao yi ge muzhuo shang mian de tongzi li mian.
fly arrive one CL wooden table top face DE bucket inside face [0212MANCT]

“A girl in green throws out the paper plane on her hand. This plane goes *across* the fence and flies into a bucket on a wooden table.”

1 utterance with only deictic

(7) yuan fang you zhi xiaoniao cong hean dui mian de shu shang
far direction have CL little bird from riverbank opposite face DE tree top

wang hean lingwai yi mian de shu shang fei *qu*
toward riverbank other one face DE tree top fly *go* [0108MANZM]

“There is a birdie in the distance flying from the top of a tree that is on the opposite side of the river bank toward the top of a tree that is on the other side of the bank.”

5 utterances with horizontal and deictic

(8) hetang zuo fang guanmucong shang you yi zhi niao
pond left direction bush top have one CL bird

xiang hetang you fang de guanmucong fei le *guo* *qu*.
toward pond right direction DE bush fly PFV *cross* *go* [0108MANSD]

“There is a bird on top of the bush to the left of the pond flying *over* toward the bush to the right of the pond.”

(9) yi zhi niao zhan zai he de yi bian de shu, fei guo he,
 one CL bird standbe-at river DE one side DE tree, fly cross river

wang lingwai yi bian de shu fei **guo qu**.
 toward other one side DE tree fly **cross go**

[0108MANCT]

“A bird is standing on a tree on one side of the river. (It) flies across the river. (It) flies over toward the tree on the other side.”

(10) you yi zhi niao, yi ge chuan luse de yifu de nuhaizi,
 have one CL bird one CL wear green DE clothes DE girl

jiang zhe zhi niao diu **guo qu**, diu guo yi tiao lu,
 JIANG this CL bird throw **cross go** throw cross one CL road

diu dao yi ge liba na bian.
 throw arrive one CL fence that side

[0113MANCT]

“There is a bird (and) a girl wearing a green shirt. (She) throws this bird over, throws (it) over a road, throws (it) to a fence.”

(11) zhalan de you ce you yi wei nuhai jiang zhifeiji
 fence DE right side have one CL girl JIANG paper plane

wang zhalan fangxiang she le **guo qu**.
 toward fence direction shoot PFV **cross go**

[0211MANS D]

“There is a girl on the right side of the fence shooting a paper plane over toward the fence.”

(12) yi ge nuhaizi diu le yi ge zhifeiji,
 one CL girl throw PFV one CL paper plane

zhifeiji cong yi ge liba shang mian **guo qu**.
 paper plane from one CL fence top face **cross go**

[0211MANCT]

“A girl threw a paper plane. The paper plane went over a fence.”

1 utterance with vertical and deictic

(13) chitang bianyuan de yi wei nuhai wang chitang nei zou le **xia qu**
 pond edge DE one CL girl toward pond inside walk PFV **go-down go**

[0501MANS D]

“A girl on the edge of the pond walked **down** toward the inside of the pond.”

5 utterances with ingressive/egressive and deictic

(14) yi ge nuhai jiang yi ge zhifeiji
one CL girl JIANG one CL paper plane

wang qian fang she le **chu qu**.
toward front direction shoot PFV **exit go**.

[0203MANSD]

“A girl threw a paper airplane **out** and forward.”

(15) yi ge chuan luse yifu de nuhaizi,
one CL wear green clothes DE girl

ba shou shang zhifeiji diu **chu qu**. Zhe feiji chuan guo liba
BA hand top paper plane throw **exit go** this plane go-through across fence

fei dao yi ge muzhuo shang mian de tongzi li mian.
fly arrive one CL wooden table top face DE bucket inside face

[0212MANCT]

“A girl in green throws **out** the paper plane on her hand. This plane goes across the fence and flies into a bucket on a wooden table.”

(16) you yi ge chuan luse yifu de nanhaizi,
have one CL wear green clothes DE boy

yong ta de zhifeiji fei-she **chu qu**,
use 3rd DE paper plane fly-shoot **exit go**

she dao dui mian yi ge changmutiao zhuzi de
shoot arrive opposite face one CL plank table DE

shang mian de yi ge tongzi li.
top face DE one CL bucket inside

[0220MANCT]

“There is a boy wearing a green shirt. (He) takes his paper plane and shoots it out. (He) shoots (it) into a bucket on a long wooden table on the other side.”

(17) yi ge nansheng jiang zhan zai chitang bianyuan de nusheng
one CL boy JIANG standbe-at pond edge DE girl

tui le **jin qu**.
push PFV **enter go**

[0504MANSD]

“A boy pushed the girl who was standing on the edge of the pond **into** (the pond).”

(18) yi ge chuizi jiang yi ge fangkuai shang de muding
one CL pond JIANG one CL cube top DE wooden-nail

qiao le *jìn* qu.
knock PFV *enter* go

[1505MANSND]

“A hammer hammered a wooden nail that was on a cube *into* (that cube).”

26 utterances with only ingressive or egressive

(19) yi ge zhifeiji cong you fang
one CL paper plane from right direction

fei *jìn* ta qian fang de tongzi li.
fly *enter* 3rd front direction DE bucket inside

[0202MANCT]

“A paper plane flies *into* the bucket in front of it from the right.”

(20) yi ge nuhaizi jiang feiji wang qian fang diu *chu*.
one CL girl JIANG planetoward front direction throw *out*

[0203MANCT]

“A girl throws the plane *out* and forward.”

(21) yi ge nuhaizi jiang ta shou shang de zhifeiji
one CL girl JIANG 3rd hand top DE paper plane

diu *jìn* qian fang de mutiao yizi shang mian de tongzi.
throw *enter* front direction DE plank chair top face DE bucket

[0204MANCT]

“A girl throws the paper plane on her hand *into* the bucket on the wooden bench in front of her.”

(22) you yi ge xiaohai she zhifeiji, kua yue zhalan,
have one CL child shoot paper plane cross cross fence

jìn *ru* lesetong zhong.
enter *enter* trash can middle

[0212MANZM]

“A child throws out a paper plane. It crosses the fence and *enters* the trash can.”

(23) yi ge nanhai xiang zhuozi shang de yi tong buzhiming de dongxi
one CL boy toward table top DE one bucket unknown DE stuff

she *chu* yi ge zhifeiji.
shoot *exit* one CL paper plane

[0220MANSND]

“A boy shoots *out* a paper plane in the direction of a basket of unknown stuff on the table.”

(24) chitang bianyuan de yi wei nuhai zou **jìn** chitang nei.
 pond edge DE one CL girl walk **enter** pond inside [0501MANSD]

“A girl on the edge of the pond walks **into** the pond.”

(25) yi ge nuhaizi zai shui bian,
 one CL girl be at water side
 ta de zuo jiao wang qian kua **jìn** shui li.
 3rd DE left foot toward front cross **enter** water inside [0501MANCT]

“A girl is beside the water. Her left foot moves forward, and (she) strides over **into** the water.”

(26) xiaohai chao shui zhong zou **ru**.
 child face water middle walk **enter** [0501MANZM]

“The child is walking into the water.”

(27) yi ge nuhaizi zhan zai hu bian, zou **jìn** shui li.
 one CL girl standbe-at lake side walk **enter** water inside [0502MANCT]

“A girl is standing beside the lake. (She) walks **into** the water.”

(28) you yi ge xiaohai zou **ru** le shui zhong.
 have one CL child walk **enter** PFV water middle [0502MANZM]

“A child walked **into** the water.”

(29) liang ge haizi yi qian yi hou zhan zai shui bian,
 two CL child one front one behind standbe-at water side
 zhan zai hou mian de nanhaizi jiang nuhaizi tui **jìn** shui li.
 standbe-at behind face DE boy JIANG girl push **enter** water inside
 [0504MANCT]

“Two kids are standing beside the water, one in the front, the other in the back. The boy standing in the back pushes the girl **into** the water.”

(30) hou mian de xiaohai ba qian mian xiaohai tui **ru** shui zhong.
 behind face DE child BA front face child push **enter** water middle
 [0504MANZM]

“The child in the back pushes the child in front of him **into** the water.”

(31) yi ge nuhai bei yi ge nanhai tui *jìn* shuichi li.
 one CL girl BEI one CL boy push *enter* pond inside [0509MANSD]

“A girl is pushed *into* the pond by a boy.”

(32) yi ge nuhaizi chuan zhe luse de yifu zhan zai shui bian,
 one CL girl wear PROG green DE clothes standbe-at water side
 na hou mian de yi ge nanhaizi ye shi chuan zhe luse yifu,
 that behind face DE one CL boy also be wear PROG green clothes
 jiang zhe ge nuhaizi tui *ru* shui li.
 JIANG this CL girl push *enter* water inside [0509MANCT]

“A girl is wearing a green shirt and standing beside the water. A boy in the back is also wearing a green shirt. (He) pushes this girl *into* the water.”

(33) you yi ge xiaohai ba lingwai yi ge xiaohai tui *jìn* le shuichi li.
 have one CL child BA other one CL child push *enter* PFV pond inside
 [0509MANZM]

“A child pushed another child *into* the pond.”

(34) yi ge langtou jiang yi ge yuanzhuxing de mutiao
 one CL hammer JIANG one CL cylinder DE wooden stick
 chui *jìn* yi ge fangkuai mutou li tou.
 hammer *enter* one CL cube wood inside head [1505MANCT]

“A hammer hammers a cylindrical wooden stick *into* a cubic piece of wood.”

(35) dingchui jiang muding chui *ru* mutoukuai zhong.
 hammer JIANG wooden nail hammer *enter* wooden cube middle [1505MANZM]

“The hammer hammers the wooden nail *into* the wooden cube.”

(36) yi ge tu chu zai fangkuai shang de muding
 one CL protrude exit be-at cube top DE wooden nail
 bei chuizi qiao le ji xia,
 BEI hammer (n.) hammer (v.) PFV several VCL
 qiao *jìn* na ge fangkuai zhi zhong.
 hammer (v.) *enter* that CL cube GEN middle [1506MANSD]

“A wooden nail that protruded from the cube was hammered several times by a hammer, and it was hammered *into* that cube.”

(37) yi ge langtou jiang yi ge xiaoyuanzhu
one CL hammer (n.) JIANG one CL little cylinder

qiao jin yi ge lifangti de mukuai.
hammer (v.) enter one CL cube DE wooden cube

[1506MANCT]

“A hammer hammers a little cylinder *into* a wooden cube.”

(38) tiechui jiang muding ding ru mukuai zhong.
hammer (n.) JIANG wooden nail hammer (v.) enter wooden cube middle

[1506MANZM]

“The hammer hammers the wooden nail *into* the wooden cube.”

(39) yi ge nanhai jiang yi ge muzhui
one CL boy JIANG one CL wooden peg

qiao jin yi ge mufangkuai li.
hammer (v.) enter one CL wooden cube inside

[1509MANSD]

“A boy hammers a wooden peg *into* a wooden cube.”

(40) yi ge nanren jiang mutou dingzi
one CL man JIANG wooden nail

wang shang qiao jin mukuai li tou.
toward top hammer (v.) enter wooden cube inside head

[1509MANCT]

“A man hammers the wooden nail up *into* the wooden cube.”

(41) yi ge ren na zhe dingchui jiang muding
one CL person hold PROG hammer (n.) JIANG wooden nail

ding ru mukuai li.
hammer (v.) enter wooden cube inside

[1509MANZM]

“A person is using a hammer to hammer the wooden nail *into* the wooden cube.”

(42) yi ge nansheng na zhe tiechui jiang yi ge muzhui
one CL boy hold PROG hammer (n.) JIANG one CL wooden peg

qiao jin yi ge mufangkuai li.
hammer (v.) enter one CL wooden cube inside

[1510MANSD]

“A boy, holding a hammer, hammers a wooden peg *into* a wooden cube.”

(43) yi ge nanren na zhe langtou wang shang
one CL man hold PROG hammer (n.) toward top

qiao yi ge muchuidingzi,
hammer (v.) one CL wooden nail,

ding jin yi ge mukuai li tou.
hammer (v.) **enter** one CL wooden cube inside head

[1510MANCT]

“A man is holding a hammer and hammering a wooden nail in an upward direction. (He) hammers (it) **into** a wooden cube.”

(44) yi ge xiaohai na zhe dingchui jiang muding
one CL child hold PROG hammer (n.) JIANG wooden nail

ding **ru** mukuai zhong.
hammer (v.) **enter** wooden cube middle

[1510MANZM]

“A child is using a hammer to hammer the wooden nail **into** the wooden cube.”

4 utterances with only *dao* (arrive)

(45) yi zhi niao bei heliu you fang de nusheng
one CL bird BEI river right direction DE girl

fangsheng **dao** heliu zuo fang de muzhalan shang.
release **arrive** river left direction DE wooden fence top [0114MANS D]

“A bird is released **to** the top of a wooden fence on the left side of the river by a girl to the right of the river.”

(46) yi ge nuhai jiang yi ge zhifeiji
one CL girl JIANG one CL paper plane

she **dao** zhuozi shang fang de feizhilou nei.
shoot **arrive** table top direction DE waste basket inside [0204MANS D]

“A girl throws a paper airplane **into** the waste basket on top of the table.”

(47) you yi ge chuan luse yifu de nanhaizi,
have one CL wear green clothes DE boy

yong ta de zhifeiji fei-she chu qu,
use 3rd DE paper plane fly-shoot exit go

she dao dui mian yi ge changmutiao zhuozi de
shoot **arrive** opposite face one CL plank table DE

shang mian de yi ge tongzi li.
top face DE one CL bucket inside [0220MANCT]

“There is a boy wearing a green shirt. (He) takes his paper plane and shoots it out. (He) shoots (it) into a bucket on a long wooden table on the other side.”

(48) chitang bianyuan de yi wei nusheng zou *dao* chitang li mian.
pond edge DE one CL girl walk *arrive* pond inside face [0502MANSND]

“A girl on the edge of the pond walks *into* the pond.”

9 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a directional phrase equivalent to *facing* or *toward*. These 9 utterances are divided into two types: preverbal and postverbal.

Preverbal: *Directional Morpheme* + XP_{LOC} + V.

(49) yi ge ren jiang yi zhi niao
one CL person JIANG one CL bird
wang zhalan fangxiang *fangsheng*.
toward fence direction *release* [0113MANSND]

“A person *releases* a bird *in the direction of* the fence.”

(50) xiaohai jiang xiaoniao *wang* qian fang *yefang*.
child JIANG little bird *toward* front direction *release*
rang ta chuan yue heliu ting zai qian fang de zhalan shang.
let 3rd go-through cross river stop be-at front direction DE fence top [0114MANZM]

“The child *releases* the birdie *toward* the area in front of her, and lets it cross the river and stop on a fence in front of her.”

(51) you ge xiaohai ba zhifeiji *wang* qian *diu*.
have CL child BA paper plane *toward* front *throw* [0203MANZM]

“There is a child *throwing* the paper plane *forward*.”

(52) yi ge xiaohai na zhe zhifeiji ba ta
one CL child hold PROG paper plane BA 3rd
wang lesetong de fangxiang *toushe*.
toward trash can DE direction *shoot* [0220MANZM]

“A child is holding a paper plane, and she *throws* it *in the direction of* a trash can.”

(53) yi ge nanren na zhe langtou **wang** shang
 one CL man hold PROG hammer (n.) **toward** top

qiao yi ge muchuidingzi,
hammer (v.) one CL wooden nail,

ding jin yi ge mukuai li tou.
 hammer (v.) enter one CL wooden cube inside head

[1510MANCT]

“A man is holding a hammer and **hammering** a wooden nail in an **upward** direction. (He) hammers (it) into a wooden cube.”

(54) yi ge zhifeiji **wang** zhuang zhe
 one CL paper plane **toward** hold PROG

yi dui feizhi de tongzi **qianjin**.
 one pile scarp paper DE bucket **advance**

[0219MANSD]

“A paper plane **advances toward** a basket that contains a pile of scrap paper.”

Postverbal: V. + Directional Morpheme + XP_{Loc}

(55) yi jia zhifeiji cong you fang **fei wang** zuo fang.
 one CL paper plane from right direction **fly toward** left direction

[0201MANSD]

“A paper airplane **flies** from the right side **toward** the left side.”

(56) yi ge nuhai jiang zhifeiji **she xiang** zhalan lingwai
 One CL girl JIANG paper-plane **shoot toward** fence other

yi bian zhuozi shang de tongzi.
 one side table top DE bucket

[0212MANSD]

“A girl **throws** the paper plane **toward** the bucket on the table on the other side of the fence.”

(57) feiji **fei xiang** yi ge shuitong.
 plane **fly toward** one CL bucket

[0219MANCT]

“The plane is **flying toward** a bucket.”

(58) you yi ge zhifeiji **fei xiang** lesetong.
 have one CL paper plane **fly toward** trash can

[0219MANZM]

“There is a paper plane **flying toward** the trash can.”

4 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a Manner-V and *zai* (be-at).

(59) xiaohai jiang xiaoniao wang qian fang yefang,
child JIANG little bird toward front direction release

rang ta chuan yue heliu ting zai qian fang de zhalan shang.
let 3rd go-through cross river stop be-at front direction DE fence top

[0114MANZM]

“The child releases the birdie toward the area in front of her, and lets it cross the river and stop on a fence in front of her.”

(60) yi ge zhifeiji ting zai feizhilou nei.
one CL paper plane stop be-at waste basket inside

[0202MANSD]

“A paper airplane comes to a stop inside the waste basket.”

(61) you ge zhifeiji luo zai lesetong shang.
have CL paper plane fall be-at trash can top

[0202MANZM]

“There is a paper plane falling on the trash can.”

(62) yi ge xiaohai jiang zhifeiji
one CL child JIANG paper plane

she zai yizi shang de lesetong nei.
shoot be-at chair top DE trash can inside

[0204MANZM]

“A child throws the paper plane into the trash can on the chair.”

2 utterances have nothing but a Manner-V.

(63) yi ge ping fei de zhifeiji
one CL horizontally fly DE paper plane

[0201MANCT]

“a paper plane that is flying horizontally.”

(64) you yi ge zhengzai feixing de zhifeiji
have one CL PROG fly DE paper plane

[0201MANZM]

“There is a paper plane that is flying.”

Utterances in Response to Vertical-Only Prompts

Relevant clauses are underlined. *Relevant morphemes are bolded and italicized.*

3 utterances with only *qi* (“rise”)

- (1) yi ge nanhai bao ***qi*** le yi zhi e xiang you fang zou qu.
 one CL boy hold ***rise*** PFV one CL goose toward right direction walk go
 [0609MANSD]

“A boy picked ***up*** a goose and walked toward the right.”

- (2) nanhaizi dun xia lai bao ***qi*** ta qian mian de yi zhi e
 boy squat go-down come hold ***rise*** 3rd front face DE one CL goose
 wang qian zou.
 toward front walk
 [0609MANCT]

“The boy squats down, picks ***up*** a goose in front of him, and walks forward.”

- (3) yi ge nanren jiang yijing dao zai di shang de xiaonanhaizi,
 one CL man JIANG already fall be-at ground top DE little-boy
qian zhe ta de you shou, la ***qi*** ta, zhan qi lai.
 hold PROG 3rd DE right hand pull ***rise*** 3rd stand rise come
 [1105MANCT]

“A man pulls ***up*** a little boy who already fell on the ground while holding his right hand. (The boy) stands up.”

7 utterances with only *shang* (“go-up”) or *xia* (“go-down”)

- (4) yi ge nanren jiang yi ge die zuo ***xia*** de nanhaizi
 one CL man JIANG one CL fall sit ***go-down*** DE boy
de shou qian qi lai, qian zhe nanhaizi de shou.
 DE hand hold rise come hold PROG boy DE hand
 [1107MANCT]

“A man picks up a hand of a boy who fell and sat ***down***. (He is) holding the boy's hand.”

- (5) yi ge nanren wo zhe ta you fang de yi ge haizi de yi zhi shou,
 one CL man hold PROG 3rd right direction DE one CL child DE one CL hand
rang xiaohaizi hua zuo ***xia*** di shang.
 let child slide sit ***go-down*** ground top
 [1108MANCT]

“A man is holding a hand of a child to his right (and) letting the child slide and sit **down** on the floor.”

- (6) daren fu zhe xiaohai manman zuo *xia*.
adult support PROG child slowly sit *go-down*

[1108MANZM]

“The adult let the child sit **down** slowly while holding him.”

- (7) yi ge nanren zhan zai yi ge xiaohaizi de zuo hou fang,
one CL man standbe-at one CL child DE left back direction

ta de shou fang zai nanhaizi tou shang,
3rd DE hand put be-at boy head top

jiang nanhaizi wang xia ya, rang nanhaizi zuo *xia*.
JIANG boy toward below press, let boy sit *go-down*

[1109MANCT]

“A man is standing to the left and at the back of a child. His hand is placed on the boy's head. (He) presses down the boy (and) lets the boy sit **down**.”

- (8) yi ge nanren bandun xia lai,
one CL man half-squat go-down come

yong ta de shou ya zai yi ge nanhaizi tou shang,
use 3rd DE hand press be-at one CL boy head top

ba ta ya *xia*, nanhaizi zuo dao di shang.
BA 3rd press *go-down* boy sit arrive ground top

[1110MANCT]

“A man half-squats down. (He) uses his hand to press on a boy's head (and) presses him **down**. The boy sits on the floor.”

- (9) yi ge nuhaizi zai shuzhi shang wan xia yao,
one CL girl be-at branch top bend go-down waist

jiang shu xia de yi ge nanhaizi la shang shuzhi shang.
JIANG tree below DE one CL boy pull *go-up* branch top

[1304MANCT]

“A girl bends her waist downward on the branch (and) pulls a boy below the tree **up** onto the branch.”

- (10) shu shang de guaiayi ba di shang de xiaohai
tree top DE strange-lady BA ground top DE child

yi ba la shang le shu.
one hold pull *go-up* PFV tree

[1304MANZM]

“The weird lady on the tree pulled the child on the ground *onto* the tree with one action.”

28 utterances with vertical and deictic

- (11) you yi ge xiaohai dun xia lai
have one CL child squat go-down come

yi ba ba e bao *qi* *lai* likai .
one hold BA goose hug *rise* *come* leave

[0609MANZM]

“A child squatted down, picked *up* the goose in one swoop, and left.”

- (12) you yi zhi fenhongse de qiu,
have one CL pink DE ball

yi ge xiaonanhai ba zhe ge qiu jian *qi* *lai*,
one CL little-boy BA this CL ball pick *rise* *come*

ba ta fang dao yi ge banyuexing de weilan li.
BA 3rd put arrive one CL crescent DE fence inside [1012MANCT]

“There is a pink ball. A little boy picks *up* this ball (and) puts it into a crescent fence.”

- (13) yi ge nanhaizi jiang yi ge qiu fang zai na ge zhalan li,
one CL boy JIANG one CL ball put be-at that CL fence inside

dun *xia* *lai* jiang qiu fang xia lai
squat *go-down* *come* JIANG ball put go-down come

fang dao zhalan li .
put arrive fence inside

[1013MANCT]

“A boy puts a ball into that fence. (He) squats *down* (and) puts the ball down. (He) puts (it) into the fence.”

- (14) yi ge nanhaizi jiang yi ge qiu fang zai na ge zhalan li,
one CL boy JIANG one CL ball put be-at that CL fence inside

dun xia lai jiang qiu fang *xia* *lai*
squat go-down come JIANG ball put *go-down* *come*

fang dao zhalan li.
put arrive fence inside

[1013MANCT]

“A boy puts a ball into that fence. (He) squats down (and) puts the ball *down*. (He) puts (it) into the fence.”

- (15) yi ge lu yifu lan kuzi de nansheng
 one CL green clothes blue pantsDE boy
 you dun zhe zishi zhan le *qi lai*.
 from squat PROG position standPFV *rise come* [1104MANSD]

“A boy in a green shirt and blue pants stood *up* from a squatting position.”

- (16) yi ge nanhaizi dun zhe, zai zhan *qi lai*.
 one CL boy squat PROG and-then stand *rise come* [1104MANCT]

“A boy is squatting. And then (he) stands *up*.”

- (17) you yi ge xiaohai zhan *qi lai*.
 have one CL child stand *rise come* [1104MANZM]

“A child stands *up*.”

- (18) yi ge daren jiang cetang zai di shang de xiaonanhai
 one CL adult JIANG lie-sideway be-at ground top DE little-boy
 la le *qi lai*.
 pull PFV *rise come* [1105MANSD]

“An adult pulled *up* a little boy who was lying on his side on the floor.”

- (19) yi ge nanren jiang yijing dao zai di shang de xiaonanhaizi,
 one CL man JIANG already fall be-at ground top DE little-boy
 qian zhe ta de you shou, la qi ta, zhan *qi lai*.
 hold PROG 3rd DE right hand pull rise 3rd stand*rise come* [1105MANCT]

“A man pulls up a little boy who already fell on the ground while holding his right hand. (The boy) stands *up*.”

- (20) baba ba gui zai di shang de xiaohai la le *qi lai*.
 father BA kneel be-at ground top DE child pull PFV *rise come* [1105MANZM]

“The father pulled *up* the child that was kneeling on the floor.”

- (21) yi ge nansheng zuo le *xia lai*.
 one CL boy sit PFV *go-down come* [1106MANSD]

“A boy sat *down*.”

- (22) yi ge nanhaizi wang qian hua zuo *xia* *lai*.
 one CL boy toward front slide sit *go-down* *come* [1106MANCT]

“A boy sits *down* and forward in a sliding manner.”

- (23) baba fu zhe xiaohai manman gui *xia* *lai*.
 father support PROG child slowly kneel *go-down* *come* [1107MANZM]

“The father let the child kneel *down* slowly while holding him.”

- (24) yi ge daren zhua zhe yi wei xiaonanhai de shou
 one CL adult grab PROG one CL little-boy DE hand
 yindao ta zuo *xia* *qu*.
 guide 3rd sit *go-down* *go* [1108MANSD]

“An adult, holding a little boy's hand, guides him through the process of sitting *down*.”

- (25) yi ge nansheng yinwei ta hou fang yi ge daren
 one CL boy because 3rd back direction one CL adult
 wang ta jianbang yi ya dao zhi ta xiang qian gui le *xia* *qu*.
 toward 3rd shoulder one press cause 3rd toward front kneel PFV *go-down* *go* [1109MANSD]

“A boy kneeled *down* and forward because a grown-up behind him pressed his shoulder down.”

- (26) yi ge nanhai yinwei ta shen hou de daren ya zhe ta jianbang
 one CL boy because 3rd body back DE adult press PROG 3rd shoulder
dao zhi ta wang xia zuo le *xia* *qu*.
 cause 3rd toward below sit PFV *go-down* *go* [1110MANSD]

“A boy sat *down* because the adult behind him was pressing down his shoulder.”

- (27) yi ge buoliping ziji dao le *xia* *qu*.
 one CL glass-bottle self fall PFV *go-down* *go* [1201MANSD]

“A glass bottle fell *down* on its own.”

- (28) yi ge pingzi dao *xia* *lai*.
 one CL bottle fall *go-down* *come* [1201MANCT]

“A bottle falls *down*.”

- (29) you yi zhi shou jiang yi ge pingzi wo qi,
 have one CL hand JIANG one CL bottle hold rise
 ranhou ba ta fang **xia lai**, fang ping
 then BA 3rd put **go-down come**, put flat [1202MANCT]

“A hand picks up a bottle and then puts it **down**, lays (it) on its side.”

- (30) zuo zai shuzhi shang de yi ge nuhaizi
 sit be-at branch top DE one CL girl
 jiang shu xia de yi ge nanhaizi la **qi lai**, la shang lai.
 JIANG tree below DE one CL boy pull **rise come**, pull go-up come
 [1303MANCT]

“A girl sitting on the branch pulls **up** a boy below the tree, (and) pulls (him) upward.”

- (31) zuo zai shuzhi shang de yi ge nuhaizi
 sit be-at branch top DE one CL girl
 jiang shu xia de yi ge nanhaizi la qi lai, la **shang lai**.
 JIANG tree below DE one CL boy pull rise come, pull **go-up come**
 [1303MANCT]

“A girl sitting on the branch pulls up a boy below the tree, (and) pulls (him) **upward**.”

- (32) zuo zai shu shang de nusheng jiang shu xia fang de nansheng
 sit be-at tree top DE girl JIANG tree below direction DE boy
 la le **shang lai**.
 pull PFV **go-up come** [1304MANSD]

“The girl sitting on the tree pulled **up** the boy below the tree.”

- (33) shu shang de guaiayi ba shu xia de xiaohai
 tree top DE strange-lady BA tree below DE child
 yi ba la **shang lai** zuo zai shu shang.
 one hold pull **go-up come** sit be-at tree top [1304MANZM]

“The weird lady on the tree pulled **up** the child below the tree with one action, and (the child) sat on the tree.”

- (34) yi ge nuhai cong shu shang pa le **xia lai**.
 one CL girl from tree top climb PFV **go-down come** [1306MANSD]

“A girl climbed **down** from the top of the tree.”

- (35) yi ge nuhaizi cong shugan shang bao zhe shugan hua *xia* *lai*
 one CL girl from trunk top hold PROG trunk slide *go-down* *come*
 [1306MANCT]

“A girl is holding onto the trunk and sliding *down* from the top of the trunk.”

- (36) yi ge nanhaizi jiang zuo zai yi ke shuzhi shang de nuhaizi
 one CL boy JIANG sit be-at one CL tree-branch top DE girl
 la *xia* *lai*.
 pull *go-down* *come*
 [1307MANCT]

“A boy is pulling *down* the girl sitting on a branch.”

- (37) mama ba la zhe xiaohai
 mother hold pull PROG child
 rang ta manman cong shu shang *xia* *lai*.
 let 3rd slowly from tree top *go-down* *come*
 [1307MANZM]

“The mother lets the child slowly get *down* from the tree while holding him.”

- (38) yi ge nanhaizi jiang zuo zai shuzhi shang de nuhaizi
 one CL boy JIANG sit be-at tree-branch top DE girl
 la *xia* *lai*.
 pull *go-down* *come*
 [1308MANCT]

“A boy pulls *down* the girl sitting on the branch.”

1 utterance with ingressive and deictic

- (39) yi ge tiechui jiang yi ge fangkuai shang de muzhui
 one CL hammer (n.) JIANG one CL cube top DE wooden-peg
 qiao le *jìn* *qu*.
 hammer (v.) PFV *enter* *go*
 [1504MANSJ]

“A hammer hammered a wooden peg that was on top of a cube *into* that cube.”

7 utterances with only ingressive/egressive

- (40) xiaohai kan zhe wo ba qiu
 child look PROG 1st BA ball
 muomuo de fang *jìn* banyuanxing mucao nei.
 quiet DE put *enter* semi-circular wooden-container inside
 [1013MANZM]

“The child put the ball *into* the semi-circular wooden container silently while looking at me.”

- (41) yi ge muzhui qian **ru** zhi yi ge mufangkuai zhi zhong.
 one CL wooden-peg embed **enter** arrive one CL wooden-cube CL middle
 [1502MANSD]

“A wooden peg is embedded *into* a wooden cube.”

- (42) yi ge mutou yuanzhuti diao **jin** lifangti de dong li tou
 one CL wood cylinder fall **enter** cube DE hole inside head
 [1502MANCT]

“A wooden cylinder falls *into* a cubic hole.”

- (43) yuanzhuxing de jimu cha **ru** le fangkuaixing de jimu zhong.
 cylinder DE block insert **enter**PFV cube DE block middle
 [1502MANZM]

“The cylindrical building block is inserted *into* the cubical building block.”

- (44) yi ge muzhui bei yi ge tiechui
 one CL wooden-peg PASSIVE one CL hammer (n.)

qiao **jin** yi ge mufangkuai li.
 hammer (v.) **enter** one CL wooden-cube inside
 [1503MANSD]

“A wooden peg is hammered *into* a wooden cube by a hammer.”

- (45) yi ge langtou jiang yi ge muchuidingzi
 one CL hammer (n.) JIANG one CL wooden-nail

qiao **jin** lifangti de mukuai dang zhong.
 hammer (v.) **enter** cube DE wooden-block right middle
 [1503MANCT]

“A hammer hammers a wooden nail *into* a cubic wooden cube.”

- (46) dingchui ba dingzi chui **ru** le mutou zhong.
 hammer (n.) BA nail hammer (v.) **enter** PFV wood middle
 [1503MANZM]

“The hammer hammered the nail *into* the wood.”

- (47) langtou jiang yi ge yuanzhui de mutou
 hammer (n.) JIANG one CL cone DE wood

qiao **jin** lifangti de mukuai.
 hammer (v.) **enter** cube DE wooden-block
 [1504MANCT]

“The hammer hammers a cylindrical piece of wood *into* a cubic wooden cube.”

(48) you yi ge chuizi ba muding
have one CL hammer (n.) BA wooden-nail

ding ru le mukuai zhong.
hammer (v.) *enter* PFV wooden-block middle

[1504MANZM]

“A hammer hammered the wooden nail *into* the wooden cube.”

(49) yi ge nansheng yong tiechui jiang yi ge muzhui
one CL boy use hammer (n.) JIANG one CL wooden-peg

chui jin mufangkuai li.
hammer (v.) *enter* wooden-cube inside

[1507MANSD]

“A boy hammers a wooden peg *into* the cube with a hammer.”

(50) yi ge nanren na zhe yi ge langtou, jiang yi ge yuanzhuti
one CL man hold PROG one CL hammer (n.), JIANG one CL cylinder

de mutou qiao jin le lifangti de mukuai li tou.
DE wood hammer (v.) *enter*PFV cube DE wooden-block inside head

[1507MANCT]

“A man was holding a hammer (and) hammered a cylindrical piece of wood *into* a wooden cube.”

(51) you yi ge ren na zhe chuizi ba muding
have one CL person hold PROG hammer (n.) BA wooden-nail

ding ru muzhuang nei.
hammer (v.) *enter* wooden-block inside

[1507MANZM]

“A person is using a hammer to hammer the wooden nail *into* the wooden pile.”

(52) yi ge nansheng na zhe tiechui jiang yi ge muzhui
one CL boy hold PROG hammer (n.) JIANG one CL wooden-peg

qiao jin mufangkuai li.
hammer (v.) *enter* wooden-cube inside

[1508MANSD]

“A boy, holding a hammer, hammers a wooden peg *into* the cube.”

(53) yi ge nanren na zhe langtou jiang yi ge dingzi
one CL man hold PROG hammer (n.) JIANG one CL nail

qiao *jin* na ge lifangti de mukuai li mian.
hammer (v.) *enter* that CL cube DE wooden-block inside face

[1508MANCT]

“A man is holding the hammer and hammering a nail *into* that wooden cube.”

(54) you yi ge xiaohai na zhe dingchui ba yuanzhuti de mutou
have one CL child hold PROG hammer (n.) BA cylinder DE wood

chui *ru* fangkuaiti de mutou zhong.
hammer (v.) *enter* cube DE wood middle

[1508MANZM]

“There is a child using a hammer to hammer a cylindrical piece of wood *into* a cubical piece of wood.”

7 utterances with only *dao* (arrive)

(55) you yi zhi fenhongse de qiu,
have one CL pink DE ball

yi ge xiaonanhai ba zhe ge qiu jian qi lai,
one CL little-boy BA this CL ball pick rise come

ba ta fang *dao* yi ge banyuexing de weilan li.
BA 3rd put *arrive* one CL crescent DE fence inside

[1012MANCT]

“There is a pink ball. A little boy picks up this ball (and) puts it into a crescent fence.”

(56) xiaohai yi pigu zuo *dao* le di shang.
child one butt sit *arrive* PFV ground top

[1106MANZM]

“The child sat on the floor with one single action.”

(57) yi ge nuhai pa *dao* shu shang zuo le xia lai.
one CL girl climb *arrive* tree top sit PFV go-down come

[1302MANSD]

“A girl climbed onto the tree and sat down.”

(58) you ge xiaohai pa *dao* shu shang qu zuo.
have CL child climb *arrive* tree top go sit

[1302MANZM]

“A child climbed up the tree to sit.”

(59) you yi ge xiaohai cong shu shang manman pa *dao* shu xia.
have one CL child from tree top slowly climb *arrive* tree below

[1306MANZM]

“A child slowly climbs from the top of the tree *to* the bottom of the tree.”

- (60) yi ke shu shang you ge daren zhua zhe yi ge xiaohai de shou
 one CL tree top have CL adult grab PROG one CL child DE hand
 jiang ta fang **dao** di-mian shang.
 JIANG 3rd put **arrive** ground-surface top [1308MANSD]

“There is an adult on a tree grabbing a child's hand and lowering him *to* the ground.”

- (61) yi ge muzhui qian ru **zhi** yi ge mufangkuai zhi zhong.
 one CL wooden-peg embed enter **arrive** one CL wooden-cube CL middle
 [1502MANSD]

“A wooden peg is embedded *into* a wooden cube.”

6 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a directional phrase equivalent to *facing* or *toward*.

Preverbal: *Directional Morpheme* + XP_{LOC} + V.

- (62) yi ge nanhai zhan zai chongwulan qian fang
 one CL boy stand be-at pet-pen front direction
 jiang yi ge fenhongse de qiu **wang** xia **fang**.
 JIANG one CL pink DE ball **toward** below **put** [1012MANSD]

“A boy, standing in front of the pet pen, is putting a pink ball down.”

- (63) yi ge daren qian zhe xiaohai de shou yindao ta **wang** xia **gui**.
 one CL adult pick PROG child DE hand guide 3rd **toward** below **kneel**
 [1107MANSD]

“An adult, holding a child's hand, guides him through the process of *kneeling* down.”

- (64) yi ge xiaohaizi bao zhe yi ke shu **wang** shang **pa**,
 one CL child hold PROG one CL tree **toward** top **climb**
 jiezhe zuo zai yi ge shuzhi shang mian.
 then sit be-at one CL tree-branch top face [1302MANCT]

“A child wraps her arms around a tree and *climbs upward*. Then (she) sits on a branch.”

- (65) zuo zai shu shang de nuhai jiang shu xia fang de nanhai
 sit be-at tree top DE girl JIANG tree down direction DE boy
wang shang **la**.
toward top **pull** [1303MANSD]

“The girl sitting on the tree *pulls* the boy below the tree *upward*.”

(66) zuo zai shu shang de mama ba zhan zai shu xia de xiaohai
sit be-at tree top DE mother BA stand be-at tree below DE child

wang shu shang *la*.
toward tree top *pull*

[1303MANZM]

“A mother sitting on the tree is *pulling* the child standing under the tree *toward* the tree top.”

(67) zuo zai shu shang de daren zhua zhe yi ge xiaohai de shou
sit be-at tree top DE adult grab PROG one CL child DE hand

ba ta *wang* xia *fang*.
BA 3rd *toward* below *put*

[1307MANSD]

“The adult sitting on the tree is grabbing a child's hand and lowering him down.”

3 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a Manner-V and *zai* (be-at).

(68) yi ge nansheng jiang yi ke fenhongse de qiu
one CL boy JIANG one CL pink DE ball

fang *zai* chongwulan nei.
put *be-at* pet-pen inside

[1013MANSD]

“A boy *puts* a pink ball in the pet pen.”

(69) daren yi ba ba haizi an *gui* *zai* di shang.
adult one hold BA child press *kneel* *be-at* ground top

[1109MANZM]

“The adult pressed the child with one action, causing him to *kneel* on the ground.”

(70) daren jiang xiaohai ya *zuo* *zai* di shang.
adult JIANG child press *sit* *be-at* ground top

[1110MANZM]

“The adult pressed the child, causing him to *sit* on the ground.”

7 utterances have nothing but a Manner-V.

(71) yi ge pingzi turanjian *dao* le.
one CL bottle suddenly *fall* PFV

[1201MANZM]

“A bottle suddenly *fell*.”

(72) you yi zhi shou jiang yi ge buoliping gei *fang dao*.
 have one CL hand JIANG one CL glass-bottle GEI *put fall* [1202MANS D]

“There is a hand *putting down* a glass bottle.”

(73) you zhi shou ba pingzi *fang dao*.
 have CL hand BA bottle *put fall* [1202MAN ZM]

“A hand placed the bottle on its side.”

(74) yi ge buoliping bei zuo fang shen guo lai
 one CL glass-bottle BEI left direction extend cross come
 yi zhi shou gei *tui dao*.
 one CL hand GEI *push fall* [1203MANS D]

“A glass bottle is *pushed down* by a hand coming from the left.”

(75) you yi zhi shou jiang ta qian mian de yi ge pingzi *tui dao* le.
 have one CL hand JIANG 3rd front face DE one CL bottle *push fall* PFV
 [1203MAN CT]

“A hand *pushed down* a bottle in front of it.”

(76) you yi zhi shou yi ba ba pingzi *tui dao* le.
 have one CL hand one hold BA bottle *push fall* PFV [1203MAN ZM]

“A hand *pushed* the bottle *down* with one push.”

(77) mama qian zhe xiaohai rang ta cong shu shang huanhuan *luo* di.
 mother hold PROG child let 3rd from tree top slowly *fall* ground
 [1308MAN ZM]

“The mother lets the child slowly get down from the tree to the ground while holding him.”

Utterances in Response to Horizontal-Deictic Prompts

Relevant clauses are underlined. *Relevant morphemes are bolded and italicized.*

27 utterances with Hor and Dei:

- (1) muzhalan shang you yi zhi niao
 wooden-fence top have one CL bird
- wang yuan fang fei le ***guo*** ***qu.***
 toward far direction fly PFV ***cross*** ***go*** [0101MANSD]

“There is a bird on the wooden fence flying toward somewhere far away.”

- (2) muzhalan shang you yi zhi niao
 wooden-fence top have one CL bird
- wang shulin de fangxiang fei le ***guo*** ***qu.***
 toward woods DE direction fly PFV ***cross*** ***go*** [0102MANSD]

“There is a bird on the fence flying toward the woods.”

- (3) zhanli zai zhalan shang mian de yi zhi niao
 stand be-at fence top face DE one CL bird
- wang qian fang yi ke shu fei ***guo*** ***qu.***
 toward front direction one CL tree fly ***cross*** ***go*** [0102MANCT]

“A bird standing on the fence flew ***over*** toward a tree in front of it.”

- (4) yi ge nuhaizi zhan zai yi tiao he bian, ta ba shou shang de niao,
 one CL girl standbe-at one CL river side 3rd BA hand top DE bird
- rang ta wang zuo qian fang fangxiang fei ***guo*** ***qu,*** fei guo he.
 let 3rd toward left front direction direction fly ***cross*** ***go*** fly cross river [0116MANCT]

“A girl is standing beside a river. The bird in her hands, (she) lets it fly ***over*** toward its front left (and) fly over the river.”

- (5) you yi zhi niao cong you hou fang de shulin fei le ***guo*** ***lai.***
 haveone CL bird from right back direction DE woods fly PFV ***cross*** ***come*** [0127MANSD]

“A bird flew ***over*** ***here*** from the woods to the right and in the back.”

- (6) yi ge nuhaizi zhan zai muzhalan de you qian fang,
 one CL girl stand be-at wooden-fence DE right front direction

jiang ta shou shang de niao song chu lai,
JIANG 3rd hand top DE bird send exit come

niao fei guo lai zhan zai muzhalan shang mian.
bird fly **cross come** stand be-at wooden-fence top face [0141MANCT]

“A girl is standing to the right of and in front of the wooden fence. (She) sends out the bird in her hands. The bird flies **over** and stands on top of the wooden fence.”

(7) yi ge nuhaizi zhan zai zhalan de dui mian,
one CL girl stand be-at fence DE opposite face

na zhe ta de zhifeiji, jiang na zhifeiji diu guo lai,
hold PROG 3rd DE paper-plane JIANG that paper-plane throw **cross come**

chuan guo zhalan diu jin yi ge tongzi li.
go-through cross fence throw enter one CL bucket inside [0214MANCT]

“A girl is standing across from the fence. (She) is holding her paper plane. (She) throws that paper plane **over**. (It) goes across the fence and is thrown into a bucket.”

(8) yi sao chuan cong heliu de yuan fang hua le guo lai.
one CL boat from river DE far direction paddle PFV **cross come**
[0301MANSND]

“A boat floated **over here** from the far end of the river.”

(9) you yi ge ren cong yuan chu hua zhe chuan guo lai.
have one CL person from far place paddle PROG boat **cross come**
[0304MANZM]

“There is a person paddling a boat **over here** from afar.”

(10) yi ge zhu zhe guaizhang de shangcanrenshi zou le guo lai.
one CL hold PROG crutch DE handicapped-person walk PFV **cross come**
[0401MANSND]

“An injured person on crutches walked **over here**.”

(11) yi zhi e wang zuo qian fang zou le guo qu.
one CL goose toward left front direction walk PFV **cross go**
[0601MANSND]

“A goose walked **over** toward the area that was on the left and in front of it.”

(12) yi zhi e zou le guo lai.
one CL goose walk PFV **cross come**
[0603MANSND]

“A goose walked **over** toward here.”

(13) yuan fang you yi zhi pang e manman zou le *guo lai.*
 far direction have one CL fat goose slowly walk PFV *cross come*
 [0603MANZM]

“A fat goose in the distance walked *over here* slowly.”

(14) yi ge nanhai bao zhe yi zhi e
 one CL boy hold PROG one CL goose
 wang you qian fang de fangxiang zou *guo lai.*
 toward right front direction DE direction walk *cross come* [0612MANSD]

“There is a child holding the goose and walking forward.”

(15) yi zhi e wang zuo qian fang de zhalan li
 one CL goose toward left front direction DE fence inside
 zou *guo qu.*
 walk *cross go* [0618MANCT]

“A goose walks *over* toward the inside of a fence that is to its left and in front of it.”

(16) yi zhi e wang qian mian de yuanzhuangwu zou *guo lai.*
 one CL goose toward front face DE circular-object walk *cross come*
 [0619MANSD]

“A goose walks *over* toward the circular object in the foreground.”

(17) nanhaizi bao qi yi zhi e wang yi ge weilan zou *guo qu.*
 boy hold rise one CL goose toward one CL pen walk *cross go*
 [0620MANCT]

“The boy picks up a goose and walks *over* toward a fence.”

(18) yi ge nanhai bao zhe yi zhi e
 one CL boy hold PROG one CL goose
 wang chongwulan de fangxiang zou le *guo qu.*
 toward pet-pen DE direction walk PFV *cross go* [0621MANSD]

“A boy walked *over* in the direction of the pet pen while holding a goose.”

(19) yi ge nanhaizi bao zhe yi zhi e
 one CL boy hold PROG one CL goose
 wang qian fang de zhalan zou *guo lai.*
 toward front direction DE fence walk *cross come* [0621MANCT]

“A boy is holding a goose and walking **over** toward the fence in the foreground.”

(20) yi ge nusheng qian zhe yi ge fongzheng
one CL girl hold PROG one CL kite

wang yi ke shu de fangxiang zou le **guo qu.**
toward one CL tree DE direction walk PFV **cross go** [0803MANSD]

“A girl walked **over** in the direction of a tree while pulling a kite.”

(21) yi ge nuhaizi shou shang na de fongzheng,
one CL girl hand top hold DE kite

wang qian fang de yi ke shu na bian zou **guo qu.**
toward front direction DE one CL tree that side walk **cross go** [0803MANCT]

“The kite that a girl is holding in her hand, (she) walks **over** toward a tree in front of her.”

(22) yi ge nuhaizi la zhe fongzheng,
one CL girl pull PROG kite

chao qian fang de yi ke shu pao **guo qu.**
toward front direction DE one CL tree run **cross go** [0804MANCT]

“A girl is pulling a kite (and) running **over** toward a tree in front of her.”

(23) yi ge fongzheng wang you qian fang de yi ke shu
one CL kite toward right front direction DE one CL tree

fei **guo qu.**
fly **cross go** [0805MANSD]

“A kite flies **over** toward a tree that is on the right and in a forward position.”

(24) yi ge fongzheng wang qian fang yi ke shu na bian
one CL kite toward front direction one CL tree that side

fei **guo qu.**
fly **cross go** [0805MANCT]

“A kite flies **over** toward a tree in front of it.”

(25) yi ge nusheng qian zhe yi ge fongzheng
one CL girl hold PROG one CL kite

wang qian fang zou le *guo qu.*
toward front direction walk PFV *cross go* [0806MANSD]

“A girl walked *over* toward the area in front of her while pulling a kite.”

(26) yi ke fenhongse de qiu wang qiumen de fangxiang fei le *guo qu.*
one CL pink DE ball toward gate DE direction fly PFV *cross go*
[1001MANSD]

“A pink ball flew *over* in the direction of the gate.”

(27) yi ke qiu wang qiumen fei *guo qu.*
one CL ball toward gate fly *cross go* [1001MANCT]

“A ball flies *over* toward the gate.”

9 utterances with only deictic

(28) jin chu muzhalan shang de xiaoniao wang yuan fang fei *qu.*
Near place wooden-fence top DE little-bird toward far direction fly *go*
[0101MANZM]

“The birdie on the nearby wooden fence flies *away* toward somewhere far.”

(29) jin chu zhalan shang de xiaoniao
Near place fence top DE little-bird

wang yuan fang de shucong fei *qu.*
toward far direction DE woods fly *go* [0102MANZM]

“The birdie on the nearby fence flies toward the trees in the distance.”

(30) yi ge xiaohai bao zhe xiaoniao jiang zhi yefang,
one CL child hold PROG little-bird JIANG 3rd release

rang ta chuanyue heliu wang qian fang fei *qu.*
let 3rd go-through river toward front direction fly *go*
[0116MANZM]

“A child holding a birdie releases it, and lets it cross the river and fly toward the area in front of it.”

(31) yuan chu de xiaoniao wang qian fang fei *lai.*
far place DE little-bird toward front direction fly *come* [0127MANZM]

“The birdie in the distance flies toward the foreground.”

- (32) yi ge nansheng bao zhe yi zhi e
 one CL boy hold PROG one CL goose
 xiang you qian fang zou **qu.**
 toward right front direction walk **go** [0610MANSD]

“A boy walks toward the area that is on the right and in front of him while holding a goose.”

- (33) wo kan dao yi ge nanhaizi bao zhe yi zhi e,
 1st see arrive one CL boy hold PROG one CL goose
 wang qian fang zou **qu.**
 toward front direction walk **go** [0612MANCT]

“I see a boy holding a goose, walking toward the foreground.”

- (34) yi zhi e chao zhe yi ge kafeise matixing de difang
 one CL goose toward PROG one CL brown horseshoe-shape DE place
 zou **lai.**
 walk **come** [0619MANZM]

“A goose is walking over toward a brown horseshoe-shaped spot.”

- (35) yi ge fongzheng ziji wang yuan fang piao **qu.**
 one CL kite self toward far direction float **go** [0801MANSD]

“A kite floats toward a faraway location on its own.”

- (36) jin chu de fongzheng wang yuan chu shu de fangxiang fei **qu.**
 near place DE kite toward far place tree DE direction fly **go**
 [0805MANZM]

“The kite in the foreground is flying **away** in the direction of a tree in the distance.”

4 utterances with only vertical

- (37) yi sao wu-ren jiashi de xiaochuan cong shangyou wang xiayou
 one CL no-person drive DE little-boat from upstream toward downstream
 piaoliu er **xia** ting kao zai an bian.
 float then **go-down** stop get-close be-at bank side [0302MANZM]

“An unmanned small boat floated from upstream toward downstream and stopped at the river bank.”

- (38) you yi ge ren hua zhe chuan
have one CL person paddle PROG boat

cong yuan fang shun liu er *xia*.
from far direction along stream then *go-down* [0303MANZM]

“There is a person paddling a boat *down* the stream.”

- (39) yi ge nan de ba yi ge nu de tui *xia* shuichi.
one CL male DE BA one CL female DE push *go-down* pond [0510MANSZD]

“A man pushes a woman *down* into the pond.”

- (40) yi ge nanhai ba yi ge nuhai tui *xia* le shuichi.
one CL boy BA one CL girl push *go-down* PFV pond [0510MANZM]

“A boy pushed a girl *down* into the pond.”

6 utterances with only horizontal

- (41) yi ge nuhaizi zhan zai yi tiao he bian, ta ba shou shang de niao,
one CL girl standbe-at one CL river side 3rdBA hand top DE bird

rang ta wang zuo qian fang fangxiang fei guo qu,
let 3rd toward left front direction direction fly cross go

fei guo he.
fly *cross* river [0116MANCT]

“A girl is standing beside a river. The bird in her hands, (she) lets it fly over toward its front left (and) fly over the river.”

- (42) nuhaizi zhan zai he bian, jiang yi zhi niao song chu qu,
girl stand be-at river side JIANG one CL bird send exit go

niao fei guo yi tiao he zhan zai yi ge muzhalan shang mian.
bird fly *cross* one CL river standbe-at one CL wooden-fence top face
[0117MANCT]

“The girl is standing beside the river. (She) sends out a bird. The bird flies over a river and stands on top of a wooden fence.”

- (43) yi ge nuhaizi shou shang bao zhe yi zhi niao, ba niao fang chu qu,
one CL girl hand top hug PROG one CL bird BA bird release exit go

niao jiu fei guo he ting zai muzhalan shang mian.
bird then fly *cross* river stop be-at wooden-fence top face [0118MANCT]

“A girl is holding a bird in her hands. (She) releases the bird. The bird then flies **over** the river and stops on the top of the wooden fence.”

(44) yi ge nuhaizi ba zhifeiji diu **guo** yi ge liba. [0213MANCT]
 one CL girl BA paper-plane throw **cross** one CL fence

“A girl throws the paper plane **over** a fence.”

(45) yi ge nuhaizi zhan zai zhalan de dui mian,
 one CL girl stand be-at fence DE opposite face
 na zhe ta de zhifeiji, jiang na zhifeiji diu guo lai,
 hold PROG 3rd DE paper-plane JIANG that paper-plane throw cross come
chuan **guo** zhalan diu jin yi ge tongzi li.
 go-through **cross** fence throw enter-J one CL bucket inside [0214MANCT]

“A girl is standing across from the fence. (She) is holding her paper plane. (She) throws that paper plane over. (It) goes **across** the fence and is thrown into a bucket.”

(46) yi ge nanzi zhu zhe liang zhi guaizhang,
 one CL man hold PROG two CL crutch
 chuan **guo** malu dao qian fang de yi ge chezi pangbian.
 go-through **cross** road arrive front direction DE one CL car beside [0402MANCT]

“Using two crutches, a man **crosses** the street and arrives at the side of a vehicle in the foreground.”

3 utterances with vertical and deictic

(47) yi tiao chuan cong shang fang huaxing xia yi tiao he,
 one CL boat from top direction paddle go-down one CL river
yi tiao he shang huaxing **xia** lai.
 one CL river top paddle **go-down** **come** [0301MANCT]

“A boat floats down a river from above. (It) floats **down** on a river.”

(48) yi sao chuan cong he de shang fang huaxing **xia** lai.
 one CL boat from river DE top direction paddle **go-down** **come** [0302MANCT]

“A boat floats **down** from the upstream stretch of the river.”

- (49) chitang bian you ge nansheng jiang yi ge nusheng tui le *xia qu*.
 pond side have CL boy JIANG one CL girl push PFV *go-down go*
 [0511MANSJ]

“Beside the pond there is a boy, and he pushed a girl *down*.”

6 utterances with ingressive/egressive and deictic

- (50) yi ge nuhaizi zhan zai he de you bian, jiang ta shou
 one CL girl stand be-at river DE right side, JIANG 3rd hand
shang de feiji wang zuo qian fang de muzhalan
 top DE paper toward left front direction DE wooden-fence
diu chu lai, fangxing chu lai.
 throw *exit come* release *exit come*
 [0115MANCT]

“A girl is standing on the right side of the river. (She) throws *out* the airplane on her hands toward the wooden fence that is on the left and in the foreground. (She) releases (it).”

- (51) nuhaizi zhan zai he bian, jiang yi zhi niao song chu qu,
 girl stand be-at river side JIANG one CL bird send *exit go*
 niao fei guo yi tiao he zhan zai yi ge muzhalan shang mian.
 bird fly cross one CL river stand be-at one CL wooden-fence top face
 [0117MANCT]

“The girl is standing beside the river. (She) sends *out* a bird. The bird flies over a river and stands on top of a wooden fence.”

- (52) yi ge nuhaizi shou shang bao zhe yi zhi niao,
 one CL girl hand top hug PROG one CL bird
ba niao fang chu qu, niao jiu fei guo he
 BA bird release *exit go* bird then fly cross river
 ting zai muzhalan shang mian.
 stop be-at wooden-fence top face
 [0118MANCT]

“A girl is holding a bird in her hands. (She) releases the bird. The bird then flies over the river and stops on the top of the wooden fence.”

- (53) yi ge nuhaizi jiang ta shou shang de niao fangxing *chu lai.*
 one CL girl JIANG 3rd hand top DE bird release *exit come*
 [0139MANCT]

“A girl releases the bird in her hands.”

(54) yi zhi e wang zuo qian fang de muzhalan zou **jìn qu.**
 one CL goose toward left front direction DE wooden-fence walk **enter-J go**
 [0602MANCT]

“A goose walks toward the wooden fence in front of it and to its left and **enters** it.”

(55) yi ge fongzheng fei **chū qu** le.
 one CL kite fly **exit go** PFV
 [0801MANCT]

“A kite has flown **out** and **away**.”

15 utterances with only ingressive or egressive

(56) yi ge nuhaizi zhan zai zhalan de dui mian,
 one CL girl stand be-at fence DE opposite face
 na zhe ta de zhifeiji, jiang na zhifeiji diu guo lai,
 hold PROG 3rd DE paper-plane JIANG that paper-plane throw cross come
 chuan guo zhalan diu **jìn** yi ge tongzi li.
 go-through cross fence throw **enter-J** one CL bucket inside
 [0214MANCT]

“A girl is standing across from the fence. (She) is holding her paper plane. (She) throws that paper plane over. (It) goes across the fence and is thrown **into** a bucket.”

(57) yuan fang de xiaohai jiang zhifeiji toushe
 far direction DE child JIANG paper-plane shoot
 rang ta kua yue zhalan **jìn ru** lesetong nei.
 let 3rd straddle over fence **enter-J enter-R** trash-can inside [0214MANZM]

“The child in the distance threw out a paper plane, and let it cross the fence and **enter** a trash can.”

(58) liang ge haizi zhan zai hu bian, nanhaizi zai nuhaizi de hou mian,
 two CL child stand be-at lake side boy be-at girl DE back face
 jiang nuhaizi tui **jìn** shui li.
 JIANG girl push **enter-J** water inside
 [0505MANCT]

“Two kids are standing beside the lake. The boy is behind the girl. (He) pushes the girl **into** the water.”

(59) hou mian de xiaohai ba qian mian xiaohai
 back face DE child BA front face child
 yi ba tui **ru** shui li
 one hold push **enter-R** water inside
 [0505MANZM]

“The child behind pushed the child in front of him *into* the water with one push.”

(60) liang ge haizi zhan zai hu bian, nanhaizi zhan zai nuhaizi hou mian,
two CL child standbe-at lake side boy standbe-at girl back face

jiang nuhaizi tui dao he li, huo tui *jin* he li.
JIANG girl push arrive river inside or push *enter-J* river inside

[0506MANCT]

“Two kids are standing beside the lake. The boy is standing behind the girl. (He) pushes the girl to the inside of the river or *into* the river.”

(61) hou fang xiaohai jiang qian fang xiaohai
back direction child JIANG front direction child

tui *ru* shui zhong.
push *enter-R* water middle

[0506MANZM]

“The child behind pushed the child in front of him *into* the water.”

(62) yi ge nuhaizi zhan zai hu bian,
one CL girl stand be-at lake side

zhan zai ta hou mian de nanhaizi
standbe-at 3rd back face DE boy

jiang nuhaizi tui *jin* shui li.
JIANG girl push *enter-J* water inside

[0511MANCT]

“A girl is standing beside the lake. The boy standing behind her pushes the girl *into* the water.”

(63) hou mian de xiaohai you yi ba ba qian fang de xiaohai
back face DE child again one hold BA front direction DE child

tui *ru* le shui zhong.
push *enter-R* PFV water middle

[0511MANZM]

“The child behind pushed the child in front of him *into* the water again with one push.”

(64) yi zhi e zou *jin* qian fang de zhalan li
one CL goose walk *enter-J* front direction DE fence inside

[0604MANCT]

“A goose walks *into* the fence in front of it.”

(65) e wang qian fang de banyuanxing mucao nei zou
goose toward front direction DE semi-circular wooden-container inside walk

bingqie *jìn* *ru* le zhe ge mucao li.
and *enter-J* *enter-R* PRV this CL wooden-container inside [0604MANZM]

“The goose walked toward the semi-circular wooden container in the foreground and *entered* this wooden container.”

(66) yi ke qiu fei *jìn* qiumen.
one CL ball fly *enter-J* gate [1002MANCT]

“A ball flies *into* the gate.”

(67) yi ke qiu fei *ru* le qiumen nei.
one CL ball fly *enter-R* PFV gate inside [1002MANZM]

“A ball flew *into* the gate.”

(68) yi ge nanhaizi jiang qiu ti *jìn* ta you qian fang de qiumen.
one CL boy JIANG ball kick *enter-J* 3rd right front direction DE gate [1004MANCT]

“A boy kicks the ball *into* the gate to the right and in front of him.”

(69) yi ge nanhaizi jiang ta jiao bian de yi ke fenhongse de qiu,
one CL boy JIANG 3rd foot side DE one CL pink DE ball
yong ta de you jiao ti *jìn* qiumen.
use 3rd DE right foot kick *enter-J* gate [1005MANCT]

“A boy uses his right foot to kick a pink ball beside his foot *into* the gate.”

(70) you yi ge xiaohai jiang qiu ti *ru* le qiumen li.
have one CL child JIANG ball kick *enter-R* PFV gate inside [1005MANZM]

“A child kicked the ball *into* the gate.”

17 utterances with only *dao* (arrive)

(71) yi tiao heliu you fang de nusheng jiang yi zhi niao
one CL river right direction DE girl JIANG one CL bird
fangsheng *dao* zuo bian de muzhalan shang.
release *arrive* left side DE wooden-fence top [0117MANS D]

“The girl on the right side of the river releases a bird *to* the wooden fence on the left.”

(72) yi ge nusheng bao zhe yi zhi niao
one CL girl hug PROG one CL bird

zhan zai heliu de you fang, ranhou ta jiang niao
stand be-at river DE right direction then 3rd JIANG bird

fangsheng **dao** heliu zuo fang de muzhalan shang mian.
release **arrive** river left direction DE wooden-fence top face

[0118MANSND]

“A girl is standing on the right side of the river, holding a bird. Then, she releases the bird **to** the top of a wooden fence on the left side of the river.”

(73) you hou fang de yi ge nusheng jiang yi zhi niao fangsheng
have back direction DE one CL girl JIANG one CL bird release

dao zuo qian fang de yi ge muzhalan shang
arrive left front direction DE one CL wooden-fence top

[0141MANSND]

“A girl to the right and in the back releases a bird **to** the top of a wooden fence to the left and at the front.”

(74) yi ge nusheng jiang zhifeiji she **dao** muzhalan
one CL girl JIANG paper-plane shoot **arrive** wooden-fence

dui mian muzhuo shang de yi ge feizhilou nei.
opposed face wooden-table top DE one CL waste-basket inside

[0214MANSND]

“A girl throws the paper airplane **into** a waste basket on the wooden table across the wooden fence.”

(75) yi sao chuan cong heliu de hou fang
one CL boat from river DE back direction

hua **dao** heliu de qian fang.
paddle **arrive** river DE front direction

[0302MANSND]

“A boat floats from the back of the river **to** the front of the river.”

(76) heliu shang you yi wei huachuan de ren you yuan **zhi** jin.
river top have one CL paddle DE person from far **arrive-Z** near

[0304MANSND]

“On the river is a person who is paddling moving from far **to** near.”

(77) yi ge zhu zhe guaizhang de shangcanrenshi
one CL hold PROG crutch DE injured-person

zou *dao* mai bingqilin de canche qian.
walk *arrive* sell ice-cream DE food-ven front [0402MANSD]

“An injured person on crutches walked *to* the front of the food truck that sold ice-cream.”

(78) yi ge nanhai jiang zhan zai chitang bianyuan de nuhai
one CL boy JIANG stand be-at pond edge DE girl

tui *dao* chitang li.
push *arrive* pond inside [0505MANSD]

“A boy pushed the girl who was standing on the edge of the pond *into* the pond.”

(79) hetang pangbian you yi wei nansheng
pond beside have one CL boy

jiang ta qian fang de nusheng tui *dao* chitang li.
JIANG 3rd front direction DE girl push *arrive* pond inside [0506MANSD]

“Beside the pond there is a boy, and he pushes the girl in front of him *into* the pond.”

(80) liang ge haizi zhan zai hu bian,
two CL child stand be-at lake side

nanhaizi zhan zai nuhaizi hou mian,
boy stand be-at girl back face

jiang nuhaizi tui *dao* he li, huo tui jin he li.
JIANG girl push *arrive* river inside or push enter-J river inside [0506MANCT]

“Two kids are standing beside the lake. The boy is standing behind the girl. (He) pushes the girl *to* the inside of the river or into the river.”

(81) yi ge nuhaizi chuan luse yifu zhan zai shui bian,
one CL girl wear green clothes stand be-at water side

you you yi ge nanhaizi chuan zhe luse de yifu,
then have one CL boy wear PROG green DE clothes

jiang zhe ge nuhaizi, qian mian zhe ge nuhaizi tui *dao* shui li.
JIANG this CL girl front face this CL girl push *arrive* water inside [0510MANCT]

“A girl is wearing a green shirt and standing beside the water. And there is a boy wearing a green shirt. (He) pushes this girl, this girl in front of him *into* the water.”

(82) yi zhi e zou *dao* zuo hou fang de chongwulan nei
 one CL goose walk *arrive* left back direction DE pet-pen inside
 zuo le xia lai.
 sit PFV go-down come [0602MANSD]

“A goose walked *into* the pet pen that is on the left and in the back and sat down.”

(83) yi zhi e ziji zou *dao* chongwulan nei.
 one CL goose self walk *arrive* pet-pen inside [0604MANSD]

“A goose walked *into* the pet pen on its own.”

(84) yi zhi e bei yi ge nanhai fang *dao* yi ge yuanxing zhalan li.
 one CL goose BEI one CL boy put *arrive* one CL circular fence inside
 [0613MANSD]

“A goose is put *into* a circular pen by a boy.”

(85) yi ge fongzheng fei *dao* yi ke shu shang mian.
 one CL kite fly *arrive* one CL tree top face [0802MANCT]

“A kite flies *onto* a tree.”

(86) yi ge fenhongse de qiu fei *dao* qiumen nei
 one CL pink DE ball fly *arrive* gate inside [1002MANSD]

“A pink ball flies *into* the gate.”

(87) nanhai jiang yi ke fenhongse de qiu ti *dao* menkuang li.
 boy JIANG one CL pink DE ball kick *arrive* gate-frame inside
 [1005MANSD]

“The boy kicks a pink ball *into* the gate.”

57 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a directional phrase equivalent to *facing* or *toward*.

34 Preverbal: *Directional Morpheme* + XP_{Loc} + V.

(88) zhanli zai muzhalan shang yi zhi niao *wang* qian *feixing*.
 Stand be-at wooden-fence top one CL bird *toward* front *fly*
 [0101MANCT]

“A bird standing on the wooden fence *flew forward*.”

(89) heliu you fang de nusheng jiang niao **wang** heliu zuo fang
River right direction DE girl JIANG bird **toward** river left direction

muzhalan de fangxiang **fangsheng**.
wooden-fence DE direction **release**

[0115MANSD]

“The girl on the right side of the river releases the bird in the direction of the wooden fence on the left side of the river.”

(90) heliu you fang nusheng jiang yi zhi niao **wang** heliu zuo fang
River right direction girl JIANG one CL bird **toward** river left direction

de yi ge muzhalan de fangxiang **fangsheng**.
DE one CL wooden-fence DE direction **release**

[0116MANSD]

“The girl on the right side of the river releases a bird in the direction of a wooden fence on the left side of the river.”

(91) you yi ge xiaohai jiang xiaoniao **wang** yuan fang **yefang**,
Have one CL child JIANG little-bird **toward** far direction **release**

xiaoniao fei yue le heliu,
little-bird fly cross PFV river

ting zai yuan fang de muzhalan shang.
stop be-at far direction DE wooden-fence top

[0118MANZM]

“A child **released** a birdie **toward** somewhere far. The birdie flew across the river and stopped on a wooden fence in the distance.”

(92) zai shulin shang mian de yi zhi niao **wang** xia **feixing**.
Be-at woods top face DE one CL bird **toward** down **fly**

[0127MANCT]

“A bird on top of the forest flies down.”

(93) yuan fang de xiaohai ba shou shang de xiaoniao
Far direction DE child BA hand top DE little-bird

wang qian **yefang** rang ta ziyou feixiang.
toward front **release** let 3rd freely fly

[0139MANZM]

“The child in the distance **releases** the birdie in her hands **forward**, and lets it fly freely.”

(94) yi ge nusheng jiang yi zhi niao
One CL girl JIANG one CL bird

wang muzhalan de fangxiang *fangsheng*.
toward wooden-fence DE direction *release*

[0140MANS D]

“A girl releases a bird in the direction of the wooden fence.”

(95) yuan chu xiaohai jiang xiaoniao
 Far place child JIANG little-bird

wang qian fang muzhalan *fang*.
toward front direction wooden-fence *release*

[0140MANZ M]

“The child in the distance releases the birdie in the direction of the wooden fence in the foreground.”

(96) yi ge ren *wang* zhalan *she* le yi ge zhifeiji.
 One CL person *toward* fence *shoot* PFV one CL paper-plane

[0213MANS D]

“A person *threw* a paper airplane *toward* the fence.”

(97) yi ge xiaohai jiang zhifeiji cong zhalan hou fang
 One CL child JIANG paper-plane from fence back direction

wang qian *she*.
toward front *shoot*

[0213MANZ M]

“A child *throws* a paper plane *forward* from behind the fence.”

(98) you yi tiao kong chuan cong shangyou *wang* xiayou *piaoliu*.
 Have one CL empty boat from upstream *toward* downstream *float*

[0301MANZ M]

“There is an empty boat *floating* from upstream *toward* downstream.”

(99) yi ge nanren zai yi tiao he shang cheng zhe chuan,
 One CL man be-at one CL river top pole PROG boat

xiang xia *huaxing*.
toward down *row*

[0303MANCT]

“A man is rowing a boat on a river. (He) is rowing downstream.”

(100) zhu zhe guaizhang de yi ge nanren
 Hold PROG crutch DE one CL man

yan zhe lu *wang* qian *zou*.
 along PROG road *toward* front *walk*

[0401MANCT]

“A man on crutches is *walking forward* along the road.”

(101) yuan fang baika de nanhai zhu zhe guaizhang
Far direction lame DE boy hold PROG crutch

jingran chuanyue le malu
surprisingly go-across PFV road

buduan de *wang* qian jixu *qianjin*.
non-stop DE *toward* front continue *advance*

[0401MANZM]

“The lame boy in the distance was using crutches, and surprisingly, he crossed the street and kept *moving forward*.”

(102) wo kan yi zhi e *wang* zuo qian fang *zou*.
1st see one CL goose *toward* left front direction *walk*

[0601MANCT]

“I see a goose *walk* *leftward* and *forward*.”

(103) yi zhi e *wang* qian fang *zou*.
One CL goose *toward* front direction *walk*

[0603MANCT]

“A goose *walks forward*.”

(104) e *wang* qian fang de banyuanxing mucao nei *zou*.
Goose *toward* front direction DE semi-circular wooden-container inside *walk*

bingqie jin ru le zhe ge mucao li.
and enter-J enter-R PFV this CL wooden-container inside

[0604MANZM]

“The goose *walked toward* the semi-circular wooden container in the foreground and entered this wooden container.”

(105) yi ge nanhaizi bao qi yi zhi e *wang* qian *zou*.
One CL boy hug rise one CL goose *toward* front *walk*

[0610MANCT]

“A boy picks up a goose and *walks forward*.”

(106) you yi ge xiaohai bao zhe e *wang* qian fang *zou*.
Have one CL child hug PROG goose *toward* front direction *walk*

[0610MANZM]

“There is a child holding the goose and *walking forward*.”

(107) yi ge xiaohai ba yi zhi e bao qi lai
 One CL child BA one CL goose hug rise come
wang banyuanxing mutou zhalan chu zou,
toward semi-circular wooden fence place walk
 ranhou jiang ta fang ru li mian.
 then JIANG 3rd put enter-R inside face [0611MANZM]

“A child picks up a goose and walks toward where the semi-circular wooden fence is. He then puts it inside.”

(108) you yi ge xiaohai bao zhe e wang qian zou.
 Have one CL child hug PROG goose toward front walk [0612MANZM]

“There is a child holding the goose and walking forward.”

(109) yi ge nanhaizi bao zhe yi zhi e, wang qian zou,
 One CL boy hug PROG one CL goose toward front walk
 zou dao yi ge banyuexing de weili li.
 walk arrive one CL crescent DE fence inside [0613MANCT]

“A boy is holding a goose (and) walking forward. (He) walks into a crescent fence.”

(110) you yi ge xiaohai bao zhe e
 Have one CL child hug PROG goose
wang kafeise matixing de zhalan zhong zou,
toward brown horseshoe-shaped DE fence middle walk
 ranhou ba e fang jin le zhalan li.
 then BA goose put enter-J PFV fence inside [0613MANZM]

“A child walked toward the brown horseshoe-shaped fence while holding a goose and then put the goose into the fence.”

(111) jin chu yi zhi pang e yao zhe pigu
 Near place one CL fat goose shake PROG butt
wang yuan chu banyuanxing de mucao zhong zou.
toward far place semi-circular DE wooden-container middle walk [0618MANZM]

“A nearby fat goose walks toward a semi-circular wooden container in the distance while shaking its butt.”

(112) you yi ge xiaohai bao zhe yi zhi e
 Have one CL child hug PROG one CL goose

wang kafeise zhalan chu *zou*.
toward brown fence place *walk*

[0620MANZM]

“There is a child *walking toward* a brown fence while holding a goose.”

(113) yuan fang de xiaohai bao zhe yi zhi e
 Far direction DE child hug PROG one CL goose

chao jin chu mucao fangxiang *qianjin*.
toward near place wooden-container direction *advance*

[0621MANZM]

“The child in the distance moves forward in the direction of a nearby wooden container while holding a goose.”

(114) you yi ge fongzheng *wang* yuan fang *piao* *zou*.
 Have one CL kite *toward* far direction *float* *walk* [0801MANZM]

“There is a kite floating away into the distance.”

(115) yi ge fongzheng *wang* qian *fei*, ka zai le shu shang.
 One CL kite *toward* front *fly* get-stuck be-at PFV tree top
 [0802MANSND]

“A kite *flew forward*, and it got stuck at the top of the tree.”

(116) you ge xiaohai fang fongzheng *chao* zhe yuan fang
 Have CL child release kite *toward* PROG far direction

de shu de fangxiang *qianjin*.
 DE tree DE direction *advance*

[0803MANZM]

“A child is flying a kite and moving forward in the direction of a tree in the distance.”

(117) yi ge nuhai qian zhe fongzheng *wang* qian *zou*,
 One CL girl hold PROG kite *toward* front *walk*

dan fongzheng bei yi ke shu gei ka zhu.
 but kite BEI one CL tree give get-stuck stop

[0804MANSND]

“A girl *walked forward* while pulling a kite, but the kite was stopped by a tree.”

(118) you ge xiaohai fang zhe fongzheng *wang* qian fang *zou*,
 Have CL child release PROG kite *toward* front direction *walk*

fongzheng ka dao le shu shang.
kite get-stuck arrive PFV tree top [0804MANZM]

“A child *walked forward* while flying a kite. The kite got stuck on the tree.”

(119) wo kan dao yi ge nuhaizi shou shang
1st see arrive one CL girl hand top

na zhe yi ge fongzheng *wang* qian fang zou *dong*.
hold PROG one CL kite *toward* front direction *walk* *move*
[0806MANCT]

“I see a girl holding a kite in her hand (and) *walking forward*.”

(120) you yi ge xiaohai cong jin chu fang fongzheng
Have one CL child from near place release kite

wang yuan chu *zou*.
toward far place *walk* [0806MANZM]

“A child is walking from the foreground into the distance while flying a kite.”

(121) xiaohai *wang* qiumen *ti* qiu.
Child *toward* gate *kick* ball [1004MANZM]

“The child *kicks* a ball *toward* the gate.”

13 Postverbal: V. + Directional Morpheme + XPLOC

(122) yuan chu de xiaohai jiang xiaoniao yefang,
Far place DE child JIANG little-bird release

rang ta chuanyue heliu *fei* *wang* qian fang de muzhalan chu.
let 3rd go-through river *fly* *toward* front direction DE wooden-fence place
[0115MANZM]

“The child in the distance released a birdie, and let it cross the river and *fly toward* the wooden fence in the foreground.”

(123) yi ge nuhaizi jiang ta shou shang de yi zhi niao fangxing,
One CL girl JIANG 3rd hand top DE one CL bird direction

niao jiu *fei* *xiang* ta qian fang de zhalan zhe bian.
bird then *fly* *toward* 3rd front direction DE fence this side
[0140MANCT]

“A girl releases a bird in her hands. *The bird then flies toward* the fence in front of it.”

(124) yi ge chuan zai le yi ge ren cong heliu de yuan fang
 One CL boat carry PFV one CL person from river DE far direction

hua xiang qian fang.

paddle toward front direction

[0303MANSD]

“A boat carried a person and floated from the far end of the river toward the front.”

(125) you yi ge baika de ren cong renxingdao
 Have one CL limp DE person from sidewalk

jingran kuayue malu zou xiang yi tai bingqilinche pang.
 surprisingly go-across road walk toward one CL ice-cream-car beside

[0402MANZM]

“A lame person is, surprisingly, crossing the street from the sidewalk and walking toward the area beside an ice-cream van.”

(126) jin chu de pang e manman zou xiang
 Near place DE fat goose slowly walk toward

yuan chu de banyuanxing mucao nei ranhou zuo xia.
 far place DE semi-circular wooden-container inside then sit go-down

[0602MANZM]

“The nearby fat goose slowly walked toward the semi-circular wooden container in the distance and then sat down.”

(127) yi ge nansheng bao zhe yi zhi e zou xiang
 One CL boy hug PROG one CL goose walk toward

you qian fang de chongwulan jiang ta fang le jin qu.
 right front direction DE pet-pen JIANG 3rd put PFV enter go

[0611MANSD]

“A boy walked toward the pet pen on the right and in front of him while holding a goose and he put it inside.”

(128) yi ge nanhaizi bao qi yi zhi e,
 One CL boy hug rise one CL goose,

zou xiang yi ge weilan li,
walk toward one CL fence inside

ba ta bao dao fang zai weilan li.
 BA 3rd hug arrive put be-at fence inside

[0611MANCT]

“A boy picks up a goose (and) walks toward the inside of a fence. (He) carries it (to the fence) and puts it inside the fence.”

(129) yi zhi e zou xiang zuo hou fang de chongwulan.
 One CL goose walk toward left back direction DE pet-pen
 [0618MANSD]

“A goose *walks toward* the pet pen on the left and in the back.”

(130) yi ge e chao xiang yi ge banyuanxing de weilan.
 One CL goose toward toward one CL semi-circular DE fence
 [0619MANCT]

“A goose is facing a semi-circular fence.”

(131) yi ge nanhai bei dui jingtou bao zhe yi zhi e
 One CL boy back face camera hug PROG one CL goose
 zou xiang qian fang de yi ge chongwulan.
 walk toward front direction DE one CL pet-pen
 [0620MANSD]

“A boy, with his back turned to the camera, walks toward a pet pen in front of him while holding a goose.”

(132) duan xian de fongzheng fei wang yuan fang
 Break line DE kite fly toward far direction
 ka zai shu shang.
 get-stuck be-at tree top
 [0802MANZM]

“A kite with a broken string flew into the distance and got stuck on a tree.”

(133) yi ke qiu fei wang qiumen de fangxiang.
 One CL ball fly toward gate DE direction
 [1001MANZM]

“A ball is flying in the direction of the gate.”

(134) yi ge fenhongse de qiu
 One CL pink DE ball
 bei yi ge nanhai ti xiang qiumen .
 BEI one CL boy kick toward gate
 [1004MANSD]

“A pink ball is *kicked toward* the gate by a boy.”

4 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a Manner-V and *zai* (be-at).

(135) nuhaizi zhan zai he bian, jiang yi zhi niao song chu qu,
 girl stand be-at river side JIANG one CL bird send exit go

niao fei guo yi tiao he zhan zai yi ge muzhalan shang mian.
bird fly cross one CL river *stand be-at* one CL wooden-fence top face

[0117MANCT]

“The girl is standing beside the river. (She) sends out a bird. The bird flies over a river and stands on top of a wooden fence.”

(136) yuan chu de xiaohai jiang xiaoniao yefang
Far place DE child JIANG little-bird release

chuanyue heliu ting zai jin chu de zhalan shang.
go-across river *stop be-at* near place DE fence top

[0117MANZM]

“The child in the distance releases a birdie, and it crosses the river and stops on a nearby fence.”

(137) yi ge nuhaizi zhan zai muzhalan de you qian fang,
One CL girl stand be-at wooden-fence DE right front direction

jiang ta shou shang de niao song chu lai,
JIANG 3rd hand top DE bird send exit come

niao fei guo lai zhan zai muzhalan shang mian.
bird fly cross come *stand be-at* wooden-fence top face

[0141MANCT]

“A girl is standing to the right of and in front of the wooden fence. (She) sends out the bird in her hands. The bird flies over and stands on top of the wooden fence.”

(138) yuan chu de xiaohai jiang xiaoniao yefang
Far place DE child JIANG little-bird release

rang ta ting zai jin chu de zhalan shang.
let 3rd *stop be-at* near place DE fence top

[0141MANZM]

“The child in the distance releases the birdie, and lets it stop on top of the nearby fence.”

3 utterances have nothing but a Manner-V.

(139) yi zhi niao bei yi ge nusheng *fangsheng*.
One CL bird BEI one CL girl *release*

[0139MANSD]

“A bird is *released* by a girl.”

(140) yi ge ren zhanli zai yi sao chuan shang,
One CL person stand be-at one CL boat top

<u>zai</u>	<u>yi</u>	<u>tiao</u>	<u>he</u>	<u>shang</u>	<u>huaxing</u>	<u>ta</u>	<u>de</u>	<u>chuan.</u>
be-at	one	CL	river	top	row	3 rd	DE	boat

[0304MANCT]

“A person is standing on a boat. (He) is **rowing** his boat on a river.”

(141) e *likai* le.
 Goose *leave* PFV

[0601MANZM]

“The goose has *left*.”

Utterances in Response to Vertical-Horizontal Prompts

Relevant clauses are underlined. *Relevant morphemes are bolded and italicized.*

3 utterances with only Vertical:

- (1) yi ge xiaohaizi zuo zai di shang,
One CL child sit be-at ground top

jiezhe pa shang pangbian de changtiao yizi shang mian.
then climb *go-up* beside DE strip chair top face [1102MANCT]

“A little child is sitting on the floor. Then (he) climbs *up* the bench nearby.”

- (2) gui zai di shang de xiaohai kuaisu gui zhe paxing
Kneel be-at ground top DE child quickly kneel PROG crawl

dao yizi pangbian, ranhou pan zhe yizi yi yue er shang.
arrive chair beside then climb PROG chair one jump and *go-up*
[1102MANZM]

“The child that was kneeling on the floor quickly crawled to the bench while kneeling and then held onto the bench and jumped *onto* it.”

- (3) daren ba xiaohai cong di shang bao shang zhuo.
Adult BA child from ground top hug *go-up* table [1103MANCT_2]

“The adult picks up the child from the floor and puts him on the table.”

1 utterance with only Deictic

- (4) nuhai zhan zai zhuozi shang jiang yi ge zhifeiji
Girl stand be-at table top JIANG one CL paper-plane

wang xia fang she qu.
toward below direction shoot *go* [0206MANSD]

“The girl is standing on the table. She throws a paper airplane downward.”

2 utterances with Horizontal and Deictic

- (5) shanpuo shang de fenhongse de qiu wang xia fang yi ge
Hill top DE pink DE ball toward below direction one CL

banyuanxing de lanzhuangwu hua le guo qu.
semi-circular DE basket-shaped slide PFV *cross go* [1015MANSD]

“The pink ball on the hill slid over toward a semi-circular basket-shaped object below.”

- (6) yi ke qiu cong yi ge tudui shang gun xia lai,
One CL ball from one CL mound top roll go-down come
- wang qian fang de muzhalan fei **guo** **lai**.
toward front direction DE wooden-fence fly **cross** **come** [1015MANCT]

“A ball rolls down from the top of a mound (and) flies **over** toward the wooden fence in front of it.”

12 utterances with Vertical and Deictic

- (7) yi ge nansheng cong yi ge xuanzhuang liuhuati shang
One CL boy from one CL spiral slide top
- hua le **xia** **lai**.
slide PFV **go-down** **come** [0703MANSF]

“A boy slid **down** from the top of a spiral slide.”

- (8) yi ge nanhaizi zai yi ge xuanzhuang de huati shang tou
One CL boy be-at one CL spiral DE slide top head
- hua **xia** **lai**.
slide **go-down** **come** [0703MANCT]

“A boy is on the top of a spiral slide and slides **down**.”

- (9) you ge xiaohai cong shuishangleyuan liuhuati de gao chu
Have CL child from water-park slide DE high place
- wang xia fang hua **xia** **lai**.
toward below direction slide **go-down** **come** [0703MANZM]

“There is a child sliding **down** from the top of a waterpark slide.”

- (10) yi ge fenhongse de qiu cong you bian de shanpuo gun **xia** **lai**
One CL pink DE ball from right side DE hill roll **go-down** **come**
- bei zuo bian de yi ge banyuanxing de lanzhuangwu
BEI left side DE one CL semi-circular DE basket-shaped-object
- gei lan zhu.
give stop stop [1011MANSF]

“A pink ball rolls **down** from the hill on the right and is stopped by a semi-circular basket-shaped object on the left.”

- (11) yi ke qiu zai yi ge tudui shang mian,
 One CL ball be-at one CL mound top face
 hua xia lai, gun dao weilan li.
 slide *go-down* *come* roll arrive fence inside [1011MANCT]

“A ball is on top of a mound. (It) slides *down*. (It) rolls into the fence.”

- (12) yi ge fenhongse de qiu cong shanpuo shang gun le xia lai.
 One CL pink DE ball from hill top roll PFV *go-down* *come*
 [1014MANSD]

“A pink ball rolled *down* from the top of the hill.”

- (13) yi ge tudui shang mian de yi ke qiu hua xia lai.
 One CL mound top face DE one CL ball slide *go-down* *come*
 [1014MANCT]

“A ball on a mound slides *down*.”

- (14) yi ke qiu cong yi ge tudui shang gun xia lai,
 One CL ball from one CL mound top roll *go-down* *come*
 wang qian fang de muzhalan fei guo lai.
 toward front direction DE wooden-fence fly cross come [1015MANCT]

“A ball rolls *down* from the top of a mound (and) flies over toward the wooden fence in front of it.”

- (15) yi ge xiaonanhai pa dao muzhuo shang zuo le xia lai.
 One CL little-boy climb arrive wooden-table top sit PFV *go-down* *come*
 [1102MANSD]

“A little boy climbed onto the wooden table and sat *down*.”

- (16) yi ge nanhaizi jiang zhuozi xia fang de
 One CL boy JIANG table below direction DE
 yi ge nanhaizi bao qi lai, zuo zai zhuozi shang mian.
 one CL boy hug *rise* *come* sit be-at table top face
 [1103MANCT_1]

“A boy picks *up* a boy under the table (and has him) sit on top of the table.”

- (17) daren jiang zuo zai yizi pangbian de
 Adult JIANG sit be-at chair beside DE
 yi ge xiaohaizi bao qi lai, zuo zai yizi shang
 one CL child hug *rise* *come* sit be-at chair top [1103MANCT_3]

“The adult picks *up* a child sitting beside the chair (and has him) sit on the chair.”

- (18) baba ba zuo zai di shang de xiaohai bao *qi lai*
 Father BA sit be-at ground top DE child hug *rise come*
 rang ta zuo zai yizi shang.
 let 3rd sit be-at chair top [1103MANZM]

“The father picked *up* the child that was sitting on the floor and let him sit on the bench.”

3 utterances with Egressive and Deictic

- (19) yi ge nusheng jiang zhifeiji wang shang she le *chu qu.*
 One CL girl JIANG paper-plane toward top shoot PFV *exit go*
 [0205MANSD]

“A girl threw the paper airplane upward.”

- (20) yi ge nuhaizi jiang ta shou shang de zhifeiji
 One CL girl JIANG 3rd hand top DE paper-plane
 wang shang diu *chu qu.*
 toward top throw *exit go* [0205MANCT]

“A girl throws the paper plane on her hand *out* and upward.”

- (21) yi ge nuhaizi zhan zai yi ge changtiao zhuozi shang mian,
 One CL girl stand be-at one CL long-strip table top face
 jiang ta shou shang zhifeiji wang xia diu *chu lai.*
 JIANG 3rd hand top paper-plane toward below throw *exit come*
 [0206MANCT]

“A girl is standing on a long table. (She) throws the paper plane on her hand *out* and downward.”

1 utterance with only ingressive

- (22) you yi ge qiu cong tuqiu gao chu gun *ru* le
 Have one CL ball from mound high place roll *enter-R* PFV
 tuqiu xia mian de banyuanxing kengdong zhong.
 mound below face DE semi-circular pit middle [1011MANZM]

“A ball rolled from the top of the mound *into* a semi-circular pit below the mound.”

1 utterance with only *dao* (arrive)

- (23) yi ge daren jiang yi ge xiaohai bao *dao* yi ge muzhuo shang.
 One CL adult JIANG one CL child hug *arrive* one CL wooden-table top
 [1103MANSND]

“An adult holds a child and puts him on a wooden table.”

4 utterances with pre-verbal directional phrases without a PATH, *dao*, or ingressive/egressive

- (24) xiaohai jiang zhifeiji *wang* qian fang *toushe*.
 Child JIANG paper-plane *toward* front direction *shoot* [0205MANZM]

“The child *throws* the paper plane *toward* the area in front of her.”

- (25) xiaohai zhan zai zhuo shang jiang zhifeiji *wang* xia *toushe*.
 Child stand be-at table top JIANG paper-plane *toward* below *shoot*
 [0206MANZM]

“The child is standing on the table, *throwing* a paper plane *downward*.”

- (26) tuqiu shang de qiu *wang* tuqiu xia *gundong*.
 Mound top DE ball *toward* mound below *roll*
 [1014MANZM]

“The ball on the mound is *rolling toward* the bottom of the mound.”

- (27) tuqiu shang de qiu *wang* tuqiu xia de
 Mound top DE ball *toward* mound below DE
 tuoyuanxing mucao fangxiang *gundong*.
 elliptic wooden-container direction *roll* [1015MANZM]

“The ball on the mound is *rolling* in the direction of the elliptic wooden container below the mound.”

3 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a Manner-V and *zai* (be-at).

- (28) yi ge nanhaizi jiang zhuozi xia fang de
 One CL boy JIANG table below direction DE
 yi ge nanhaizi bao qi lai, zuo zai zhuozi shang mian.
 one CL boy hug rise come *sit be-at* table top face
 [1103MANCT_1]

“A boy picks up a boy under the table (and has him) sit on top of the table.”

- (29) daren jiang zuo zai yizi pangbian de
 Adult JIANG sit be-at chair beside DE

yi ge xiaohaizi bao qi lai, zuo zai yizi shang
 one CL child hug rise come *sit be-at* chair top [1103MANCT_3]

“The adult picks up a child sitting beside the chair (and has him) sit on the chair.”

(30) baba ba zuo zai di shang de xiaohai bao qi lai
 Father BA sit be-at ground top DE child hug rise come

rang ta zuo zai yizi shang.
 let 3rd *sit be-at* chair top [1103MANZM]

“The father picked up the child that was sitting on the floor and let him sit on the bench.”

Utterances in Response to Prompts that Have All Three Coordinates

Relevant clauses are underlined. *Relevant morphemes are bolded and italicized.*

13 utterances with only vertical:

- (1) yi zhi e zou *shang* tudui, wang zhalan fangxiang zou.
 one CL goose walk *go-up* mound toward fence direction walk
 [0605MANCT]

“A goose walks *up* the mound (and) walks in the direction of the fence.”

- (2) yi zhi e pa *shang* tudui
 One CL goose climb *go-up* mound
 zou jin tudui shang mian de yi ge zhalan li.
 walk enter-J mound top face DE one CL fence inside
 [0606MANCT]

“A goose climbs *up* the mound and walks into a fence on the mound.”

- (3) pang e jingran pa *shang* le tuqiu gao chu
 Fat goose surprisingly climb *go-up* PFV mound high place
 jin ru mucao nei zuo xia.
 enter-J enter-R wooden-container inside sit go-down
 [0606MANZM]

“Surprisingly, the fat goose climbed *up* to the high area of the mound, entered a wooden container, and sat down.”

- (4) yi ge datudui shang mian you yi zhi e,
 One CL big-mound top face have one CL goose
 e jiu wang xia zou *shang* yi ge yuanpen li tou.
 goose then toward down walk *go-up* one CL round-basin inside head
 [0608MANCT]

“There is a goose on a big mound. The goose moves downward and walks *onto* a round basin.”

- (5) yi ge nanhaizi bao qi yi zhi e zou *shang* shanpuo.
 One CL boy hug rise one CL goose walk *go-up* hill
 [0614MANCT]

“A boy picks up a goose and walks *up* the hill.”

- (6) yi ge nanhaizi bao zhe yi zhi e zou *shang* yi ge tudui,
 One CL boy hug PROG one CL goose walk *go-up* one CL mound

ba e fang jin tudui shang mian de zhalan li.
BA goose put enter-J mound top face DE fence inside [0615MANCT]

“A boy is holding a goose and walking **up** a mound. (He) puts the goose in the fence the fence on the mound.”

(7) yi ge nanhaizi bao zhe yi zhi e zou **xia** shanpuo
One CL boy hug PROG one CL goose walk **go-down** hill

chao zhe yi ge banyuexing de weili.
face PROG one CL crescent DE fence [0616MANCT]

“A boy walks **down** the hill while holding a goose and facing a crescent fence.”

(8) yi ge wanjuche cong yi ge shandong de you qian fang
one CL toy-vehicle from one CL tunnel DE right front direction

de tudui shang mian hua **xia** tudui,
DE mound top face slide **go-down** mound

jin ru zuo fang de shandong li tou.
enter-J enter-R left direction DE tunnel inside head [0902MANCT]

“From the top of a mound that is to the right and in front of a tunnel, a toy car slides **down** the mound (and) enters the tunnel on the left.”

(9) wanjuche cong gao chu tuqiu huanhuan **xia** puo
toy-vehicle from high place mound slowly **go-down** slope

hua ru suidao nei.
slide enter-R tunnel inside [0902MANZM]

“The toy vehicle slowly goes **down** from the top of the mound and slides into the tunnel.”

(10) yi ge wanjuche hua **shang** tudui shang mian
one CL toy-vehicle slide **go-up** mound top face

de xiaoshandong li tou.
DE little-tunnel inside head [0903MANCT]

“A toy car slides **up** to the inside of the little tunnel on the mound.”

(11) yi ge wanjuche ziji pa **shang** le shanpuo shang de shandong.
one CL toy-vehicle self float **go-up** PFV hill top DE tunnel [0904MANSF]

“A toy vehicle climbed **up** the tunnel on the hill on its own.”

(12) yi ge wanjuche pa shang yi ge xiepuo
 one CL toy-vehicle climb *go-up* one CL slope

jin ru le yi ge suidao.
 enter-J enter-R PFV one CL tunnel

[0904MANCT]

“A toy car climbed *up* a slope (and) entered a tunnel.”

(13) yi ge nusheng pa shang yi ge qingxie de shu.
 One CL girl climb *go-up* one CL tilted DE tree

[1301MANSD]

“A girl climbs *up* a leaning tree.”

10 utterances with only Horizontal

(14) yi zhi niao cong yi ke shu shang fei guo yi tiao he.
 One CL bird from one CL tree top fly *cross* one CL river [0109MANCT]

“A bird flies *across* a river from the top of a tree.”

(15) zhan zai he bian de yi zhi niao fei guo he bian,
 Stand be-at river side DE one CL bird fly *cross* river side

wang qian fang de yi ke shu fei guo qu.
 toward front direction DE one CL tree fly cross go

[0110MANCT]

“A bird standing beside the river flies *across* the river side and flies over toward a tree in front of it.”

(16) wo kan dao yi zhi niao fei guo yi tiao he
 1st see arrive one CL bird fly *cross* one CL river

ting zai yi ke shu shang.
 stop be-at one CL tree top

[0111MANCT]

“I see a bird fly *over* a river and stop on top of a tree.”

(17) zai he bian de yi ke shu shang de yi zhi niao
 Be-at river side DE one CL tree top DE one CL bird

wang zuo qian fang de yi ke shu fei guo he
 toward left front direction DE one CL tree fly *cross* river

ting zai zuo qian fang de yi ke shu shang mian.
 stop be-at left front direction DE one CL tree top face

[0112MANCT]

“A bird on a tree by the riverside flies **over** the river toward a tree to its left and in front of it, and (it) stops on top of a tree to its left and in front of it.”

- (18) yi ge nuhaizi zhan zai tudui shang mian,
One CL girl stand be-at mound top face
- jiang ta shou shang de niao fang chu qu, niao fei **guo** he,
JIANG 3rd hand top DE bird release exit go bird fly **cross** river
- wang qian fang de yi ke shu fei guo qu.
toward front direction DE one CL tree fly cross go [0119MANCT]

“A girl is standing on top of a mound. (She) releases the bird in her hands. The bird flies **across** the river (and) flies over toward a tree in front of it.”

- (19) wo kan dao yi zhi niao, zhe ge nuhaizi ba ta fangxing,
1st see arrive one CL bird this CL girl BA 3rd direction
- zhe zhi niao jiu fei **guo** yi tiao he,
this CL bird then fly **cross** one CL river
- wang zhe ge xiaohaizi de zuo qian fang yi ge tudui shang mian
toward this CL child DE left front direction one CL mound top face
- de muzhalan shang mian fei guo qu.
DE wooden-fence top face fly cross go [0121MANCT]

“I see a bird. This girl releases it. This bird then flies **over** a river (and) flies toward the top of a wooden fence on a mound that is in front of and to the left of this child.”

- (20) yi ge nuhaizi ba ta shou shang de niao song chu qu,
One CL girl BA 3rd hand top DE bird send exit go
- na niao fei **guo** he bian, ting zai qian fang yi ge tudui
that bird fly **cross** river side stop be-at front direction one CL mound
- shang mian de muzhalan shang mian.
top face DE wooden-fence top face [0122MANCT]

“A girl sends out the bird in her hands. That bird flies **over** the riverside (and) stops on a wooden fence on a mound in front of it.”

- (21) yi ge nuhaizi zhan zai yi ge tudui shang mian,
One CL girl stand be-at one CL mound top face
- qian mian you yi tiao he, ta jiang ta shou shang de niao
front face have one CL river 3rd JIANG 3rd hand top DE bird

wang qian fang chu qu, niao ne fei guo yi tiao he,
toward front direction exit go bird PART fly **cross** one CL river

ting zai muzhalan shang mian.
stop be-at wooden-fence top face

[0123MANCT]

“A girl is standing on a mound. There is a river in front of it. She sends the bird in her hands out and forward. The bird then flies **over** a river (and) stops on the wooden fence.”

(22) yi ge nuhaizi zhan zai yi ge shidui shang mian,
One CL girl stand be-at one CL rock-pile top face

jiang ta shou shang de yi zhi niao wang qian fang chu,
JIANG 3rd hand top DE one CL bird toward front release exit

zhe ge niao ne jiu fei guo he
this CL bird PART then fly **cross** river

ting zai muzhalan shang mian.
stop be-at wooden-fence top face

[0124MANCT]

“A girl is standing on a rock. (She) sends a bird in her hands out and forward. This bird then flies **over** the river and stops on top of the wooden fence.”

(23) yi ge nuhaizi zai he de lingwai yi bian,
One CL girl be-at river DE other one side

jiang shou shang de niao fang chu, niao fei guo he,
JIANG hand top DE bird release exit bird fly **cross** river

zhanli zai yi ge tudui shang mian de zhalan shang mian.
stand be-at one CL mound top face DE fence top face

[0126MANCT]

“A girl is on the other side of the river. (She) releases the bird in her hands. The bird flies **across** the river (and) stands on a fence on a mound.”

5 utterances with only deictic

(24) yuan chu zhalan shang de xiaoniao
Far place fence top DE little-bird

wang jin chu de shu fangxiang fei lai.
toward near place DE tree direction fly **come**

[0106MANZM]

“The birdie on the fence in the distance flies in the direction of a nearby tree.”

(25) you yi zhi xiaoniao cong jin chu de shu shang
Have one CL little-bird from near place DE tree top

wang yuan fang de zhalan chu fei *qu*.
toward far direction DE fence place fly *go*

[0107MANZM]

“There is a birdie flying from the top of a nearby tree toward a fence in the distance.”

(26) jin chu shuzhi shang de xiaoniao kuayue heliu
Near place branch top DE little-bird cross river

wang yuan chu de lingwai yi ke shu fei *qu*.
toward far place DE other one CL tree fly *go*

[0110MANZM]

“The birdie on the top of a nearby tree branch crosses the river and flies toward another tree in the distance.”

(27) you yi ge xiaohai jiang xiaoniao yefang,
Have one CL child JIANG little-bird release

rang ta chuan yue heliu
let 3rd go-through over river

wang tuqiu muzhalan de fangxiang fei *qu*.
toward mound wooden-fence DE direction fly *go*

[0121MANZM]

“A child releases the birdie, and lets it cross the river and fly in the direction of the wooden fence on the mound.”

(28) you yi ke qiu wang qiukuang fangxiang fei *lai*
Have one CL ball toward goal direction fly *come*

[1006MANZM]

“There is a ball flying over in the direction of the hoop.”

14 utterances with Horizontal and Deictic

(29) zuo hou fang zhalan shang de yi zhi niao
Left behind direction fence top DE one CL bird

wang you qian fang de yi ke shu fei le *guo lai*.
toward right front direction DE one CL tree fly PFV *cross come*

[0106MANSD]

“A bird on top of the fence on the left and in the back flew toward a tree on the right and in the foreground.”

(30) yi zhi zhan zai zhalan shang de niao,
One CL stand be-at fence top DE bird

wang ta de qian fang de yi ke shu shang fei **guo lai.**
 toward 3rd DE front direction DE one CL tree top fly **cross come**
 [0106MANCT]

“A bird standing on the fence flies **over** toward the top of a tree that is in front of it.”

(31) you fang yi ke shu shang de yi zhi niao
 Right direction one CL tree top DE one CL bird
 xiang zuo fang de muzhalan fei le **guo qu**
 toward left direction DE wooden-fence fly PFV **cross go** [0107MANS]

“A bird on top of a tree on the right flew toward the wooden fence on the left.”

(32) yi ge niao zhan zai yi ke shu shang, you wang qian,
 One CL bird stand be-at one CL tree top then toward front
 wang ta de qian fang de muzhalan fei **guo qu.**
 toward 3rd DE front direction DE wooden-fence fly **cross go** [0107MANCT]

“A bird is standing on a tree. And it moves forward. (It) flies **over** toward the wooden fence in front of it.”

(33) zhan zai he bian de yi zhi niao fei guo he bian,
 Stand be-at river side DE one CL bird fly cross river side
 wang qian fang de yi ke shu fei **guo qu.**
 toward front direction DE one CL tree fly **cross go** [0110MANCT]

“A bird standing beside the river flies across the river side and flies **over** toward a tree in front of it.”

(34) yi ge nuhaizi zhan zai tudui shang mian,
 One CL girl stand be-at mound top face
 jiang ta shou shang de niao fang chu qu, niao fei guo he,
 JIANG 3rd hand top DE bird release exit go bird fly cross river
 wang qian fang de yi ke shu fei **guo qu.**
 toward front direction DE one CL tree fly **cross go** [0119MANCT]

“A girl is standing on top of a mound. (She) releases the bird in her hands. The bird flies across the river (and) flies **over** toward a tree in front of it.”

(35) wo kan dao yi zhi niao, zhe ge nuhaizi ba ta fangxing,
 1st see arrive one CL bird this CL girl BA 3rd direction
 zhe zhi niao jiu fei guo yi tiao he,
 this CL bird then fly cross one CL river

wang zhe ge xiaohaizi de zuo qian fang yi ge tudui shang mian
toward this CL child DE left front direction one CL mound top face

de muzhalan shang mian fei *guo qu*.
DE wooden-fence top face fly *cross go*

[0121MANCT]

“I see a bird. This girl releases it. This bird then flies over a river (and) flies toward the top of a wooden fence on a mound that is in front of and to the left of this child.”

(36) you yi ge xiaohai na zhe zhifeiji
Have one CL child hold PROG paper-plane

chao zhe wo diu *guo lai*.
toward PROG 1st throw *cross come*

[0207MANZM]

“A child was holding a paper plane and throwing it over in my direction.”

(37) yi ge shitou shang de nusheng
One CL rock top DE girl

jiang zhifeiji wang qian fang she le *guo lai*.
JIANG paper-plane toward front direction shoot PFV *cross come*

[0208MANSD]

“A girl on the rock threw the paper airplane *over* toward the foreground.”

(38) yi zhi e wang shanpuo shang de chongwulan zou le *guo qu*.
One CL goose toward hill top DE pet-pen walk PFV *cross go*

[0605MANSD]

“A goose walked *over* toward the pet pen on top of the hill.”

(39) yi ge daren bao zhe yi ge xiaohai jiang ta cong liuhuati de
One CL adult hug PROG one CL child JIANG 3rd from slide DE

shang fang wang xia fang hua *guo qu*.
top direction toward down direction slide *cross go*

[0706MANSD]

“An adult slides a child downward from the top of the slide while holding him.”

(40) xiaopuo shang de wanju che wang xia fang de shandong
little-slope top DE toy-vehicle toward down direction DE tunnel

hua le *guo lai*.
slide PFV *cross come*

[0901MANSD]

“The toy vehicle on the small hill slid *over* toward the tunnel below.”

(41) yi ke fenhongse de qiu ziji wang lankuang de fangxiang
One CL pink DE ball self toward goal DE direction

fei le *guo lai.*
fly PFV *cross come*

[1006MANSD]

“A pink ball flew *over* in the direction of the basket on its own.”

(42) yi ge xiaohai kan dao yi ke qingxie de yezishu,
One CL child see arrive one CL tilted DE coconut-tree

zou guo qu ranhou pa dao shu shang.
walk *cross go* then climb arrive tree top

[1301MANZM]

“A child saw a tilted coconut tree, walked *over* there, and climbed up the tree.”

21 utterances with Vertical and Deictic

(43) yi ge nuhaizi zhan zai tudui shang mian, jiang ta shou shang
One CL girl stand be-at mound top face JIANG 3rd hand top

yi ge zhifeiji wang ta de you qian fang diu xia qu.
one CL paper-plane toward 3rd DE right front direction throw *go-down go*

[0215MANCT]

“A girl is standing on the mound. (She) throws *down* a paper plane on her hand toward the space to her right and in front of her.”

(44) shuichi pangbian de yi kuai shitou shang de nansheng
Pond beside DE one CL rock top DE boy

jiang ta qian fang de nusheng wang shuichi tui *xia qu.*
JIANG 3rd front direction DE girl toward pond push *go-down go*

[0508MANSD]

“A boy on a rock next to the pond pushes the girl in front of him *down* toward the pond.”

(45) e cong gao chu tuqiu xia lai
Goose from high place mound *go-down come*

jin ru banyuanxing de mucao nei.
enter-J enter-R semicircular DE wooden-container inside

[0608MANZM]

“The goose came *down* from top of the mound and entered the semi-circular wooden container.”

(46) liuhuati shang you yi ge nansheng hua le *xia lai*
Slide top have one CL boy slide PFV *go-down come*

[0701MANSD]

“There is a boy on the slide sliding **down**.”

- (47) yi ge xiaonanhai zai huati shang mian hua **xia** **lai**.
 One CL little-boy be-at slide top face slide **go-down** **come**
 [0701MANCT]

“A little boy slides **down** on the slide.”

- (48) you ge xiaohai zheng cong liuhuati gao chu liu **xia** **lai**.
 Have CL child PROG from slide high place slide **go-down** **come**
 [0701MANZM]

“There is a child sliding **down** from the top of the slide.”

- (49) yi ge xiaonanhai cong liuhuati shang hua le **xia** **lai**.
 One CL little-boy from slide top slide PFV **go-down** **come**
 [0702MANSND]

“A little boy slid **down** from the top of the slide.”

- (50) yi ge nanhaizi cong huati shang mian hua **xia** **lai**.
 One CL boy from slide top face slide **go-down** **come** [0702MANCT]

“A boy slides **down** from the top of the slide.”

- (51) xiaohai cong liuhuati shang liu le **xia** **lai**
 Child from slide top slide PFV **go-down** **come**
 ranhou zuo dao di shang.
 then sit arrive ground top [0702MANZM]

“The child slid **down** from the top of the slide, and then sat on the ground.”

- (52) liuhuati shang fang de nanhai bei shen hou de daren
 Slide top direction DE boy BEI body behind DE adult
 tui le **xia** **qu**.
 push PFV **go-down** **go** [0704MANSND]

“The boy on the slide was pushed **down** by the grown-up behind him.”

- (53) yi ge nanren jiang ta de xiaohaizi cong huati shang mian
 One CL man JIANG 3rd DE child from slide top face
 fang **xia** **lai**, hua xia huati,
 put **go-down** **come** slide go-down slide

ta zhan zai huati de hou bian, jiang xiaohaizi cong shang mian
3rd stand be-at slide DE behind side JIANG child from top face

fang xia huati, xiaohaizi hua xia huati.
put go-down slide child slide go-down slide [0704MANCT]

“A man lets his kid go down from the top of the slide (and) slide down the slide. He is standing behind the slide. (He) lets the child go down the slide from the top, (and) the child slides down the slide.”

(54) baba ba xiaohai cong liuhuati shang tui *xia* *lai*.
Father BA child from slide top push *go-down* *come* [0704MANZM]

“The father pushes the child *down* from the top of the slide.”

(55) yi ge daren jiang liuhuati shang fang de nanhai
One CL adult JIANG slide top direction DE boy

tui le *xia* *qu*.
push PFV *go-down* *go* [0705MANS D]

“A grown-up pushed the boy on the slide *down*.”

(56) yi ge nanren bao zhe yi ge xiaohaizi, zai yi ge huati
One CL man hug PROG one CL child be-at one CL slide

de hou fang, jiang xiaohaizi fang zai huati
DE behind direction JIANG child put be-at slide

de shang mian, rang xiaohaizi huaxing *xia* *lai*.
DE top face let child slide *go-down* *come* [0705MANCT]

“A man is holding a kid, (and he) is behind a slide. (He) puts the kid on the slide (and) lets the kid slide down.”

(57) yi ge nanren bao zhe yi ge xiaohaizi
One CL man hug PROG one CL child

cong huati shang tou hua *xia* *lai*.
from slide top head slide *go-down* *come* [0706MANCT]

“A man is holding a kid (and lets him) slide down from the top of the slide.”

(58) yi ge baba bao zhe ta de xiaohaizi
One CL father hug PROG 3rd DE child

zai yi ge huati shang mian cong shang hua *xia* *lai*.
 be-at one CL slide top face from top slide *go-down* *come*
 [0707MANCT]

“A father is holding his child on a slide, (and the child) slides *down* from the top.”

(59) daren fu zhe xiaohai cong liuhuati shang liu *xia* *lai*.
 Adult support PROG child from other top slide *go-down* *come*
 [0707MANZM]

“The adult slides *down* from the top of the slide while supporting the child.”

(60) yi ge wanjuche cong yi ge tudui shang mian hua *xia* *lai*,
 one CL toy-vehicle from one CL mound top face slide *go-down* *come*

 hua jin le yi ge shandong.
 slide enter-J PFV one CL tunnel
 [0901MANCT]

“A toy car slid *down* from the top of a mound (and) slid into a tunnel.”

(61) yi ge nuhai cong shu shang pa le *xia* *lai*
 One CL girl from tree top climb PFV *go-down* *come*

 bing wang shu de fan fangxiang yuanli.
 and toward tree DE opposite direction leave
 [1305MANSD]

“A girl climbed *down* from the top of the tree and went away in the opposite direction of the tree.”

(62) yi ge haizi zai yi ke shu shang huaxing *xia* *lai*.
 One CL child be-at one CL tree top slide *go-down* *come*
 [1305MANCT]

“A child is sliding *downward* on a tree.”

(63) you yi ge xiaohai cong shu shang pa *xia* *lai* likai.
 Have one CL child from tree top climb *go-down* *come* leave
 [1305MANZM]

“A child climbed *down* from the tree top and left.”

3 utterances with egressive and deictic

(64) nuhaizi jiang shou shang de niao
 Girl JIANG hand top DE bird

 wang muzhalan fangxiang song *chu qu*.
 toward wooden-fence direction send *exit go*
 [0125MANCT]

“The girl sends *out* the bird in her hands in the direction of the wooden fence.”

- (65) yi ge nusheng jiang zhifeiji
One CL girl JIANG paper-plane
- wang shang fang she le *chu qu.*
toward top direction shoot PFV *exit go* [0207MANSD]

“A girl threw the paper airplane upward.”

- (66) yi wei zhan zai shikuai shang de nuhai
One CL stand be-at rock top DE girl
- jiang zhifeiji wang qian she le *chu qu.*
JIANG paper-plane toward front shoot PFV *exit go* [0215MANSD]

“A girl standing on the rock threw the paper plane *out* and forward.”

32 utterances with only ingressive or egressive

- (67) yi ge nuhaizi zhan zai yi ge da tudui shang mian,
One CL girl stand be-at one CL big mound top face
- ba ta shou shang de zhifeiji wang xia diu *chu.*
BA 3rd hand top DE paper-plane toward below throw *exit* [0208MANCT]

“A girl is standing on a big mound. (She) throws the paper plane on her hand *out* and downward.”

- (68) yi ge nuhaizi zhan zai yi ge tudui shang mian,
One CL girl stand be-at one CL mound top face
- jiang ta shou shang de zhifeiji
JIANG 3rd hand top DE paper-plane
- wang qian diu *jin* yi ge tongzi li.
toward front throw *enter-J* one CL bucket inside [0209MANCT]

“A girl is standing on a mound. (She) throws the paper plane on her hand forward and *into* a bucket.”

- (69) yuan chu de xiaohai toushe zhifeiji,
Far place DE child throw paper-plane
- zhifeiji luo *ru* jin chu de lesetong li.
paper-plane fall *enter-R* near place DE trash-can inside [0209MANZM]

“The child in the distance threw a paper plane. The paper plane fell *into* the nearby trash can.”

(70) yi ge nuhaizi na le zhifeiji wang qian diu,
One CL girl take PFV paper-plane toward front throw

zhifeiji diao jin yi ge tongzi li.
paper-plane fall **enter-J** one CL bucket inside

[0210MANCT]

“A girl took the paper plane and threw it forward. The paper plane fell *into* a bucket.”

(71) you yi ge xiaohai jiang zhifeiji wang qian fang
Have one CL child JIANG paper-plane toward front direction

tudui shang de lesetong zhong she,
mound top DE trash-can middle shoot

feiji she ru le lesetong li.
plane shoot **enter-R** PFV trash-can inside

[0210MANZM]

“A child threw the paper airplane toward the inside of the trash can on the mound in front of her. The airplane was thrown *into* the trash can.”

(72) yi ge nuhaizi zhan zai yi ge gao chu,
One CL girl stand be-at one CL high place

jiang shou shang de zhifeiji diu jin
JIANG hand top DE paper-plane throw **enter-J**

yuan fang qian mian de yi ke shu shang.
far direction front face DE one CL tree top

[0217MANCT]

“A girl is standing in a high place. (She) throws the paper plane on her hand *into* a tree in the distance and in front of her.”

(73) liang ge haizi zhan zai tudui shang mian,
Two CL child stand be-at mound top face

nanhaizi jiang nuhaizi tui jin shui li.
boy JIANG girl push **enter-J** water inside

[0507MANCT]

“Two kids are standing on the mound. The boy pushes the girl *into* the water.”

(74) hou mian de xiaohai jiang qian mian
Behind face DE child JIANG front face

de xiaohai tui ru le shui li.
DE child push **enter-R** PFV water inside

[0507MANZM]

“The child behind pushed the child in front of him *into* the water.”

(75) zhan zai hou mian de xiaohai ba zhan zai qian mian
Stand be-at behind face DE child BA stand be-at front face

de xiaohai tui **jìn** le chitang.
DE child push **enter-J** PFV pond

[0508MANZM]

“The child standing behind pushed the child standing in front of him **into** the pond.”

(76) liang ge haizi ne zhan zai tudui shang mian,
Two CL child PART stand be-at mound top face

nanhaizi jiang zhan zai qian mian de nuhaizi tui **jìn** shui li.
boy JIANG standbe-at front face DE girl push **enter-J** water inside

[0512MANCT]

“Two kids are standing on the mound. The boy pushes the girl standing in front of him **into** the water.”

(77) hou mian de xiaohai jiang qian fang de xiaohai
Behind face DE child JIANG front direction DE child

yi ba tui **ru** shui li.
one hold push **enter-R** water inside

[0512MANZM]

“The child behind pushed the child in front of him **into** the water with one push.”

(78) liang ge haizi ne zhan zai yi ge tudui shang mian,
Two CL child PART stand be-at one CL mound top face

nanhaizi zhan zai nuhaizi hou mian,
boy stand be-at girl behind face

jiang nuhaizi yong shou tui **jìn** le shui li.
JIANG girl use hand push **enter-J** PFV water inside

[0513MANCT]

“Two kids are standing on a mound. The boy is standing behind the girl. (He) uses his hands to push the girl **into** the water.”

(79) hou mian de xiaohai ba qian mian de xiaohai
Behind face DE child BA front face DE child

tui **ru** le shui zhong.
push **enter-R** PRV water middle

[0513MANZM]

“The child behind pushed the child in front of him **into** the water.”

(80) yi ge nanhaizi zhan zai tudui shang bao zhe yi zhi e,
One CL boy stand be-at mound top hug PROG one CL goose

wang xia zou **jin** yi ge zhalan li.
toward down walk **enter-J** one CL fence inside

[0617MANCT]

“A boy is standing on the mound and holding a goose. (He) walks down **into** a fence.”

(81) yuan fang tuqiu shang de xiaohai
Far direction mound top DE child

bao zhe e zou xiang le jin fang
hug PROG goose walk toward PFV near direction

banyuanxing mucao nei
semi-circular wooden-container inside

bing jiang e fang **ru** mucao zhong.
and JIANG goose put **enter-R** wooden-container middle

[0617MANZM]

“A child on the mound in the distance walked toward a nearby semi-circular wooden container while holding a goose and then put the goose **into** the wooden container.”

(82) yi ge wanjuche cong yi ge tudui shang mian hua xia lai,
one CL toy-vehicle from one CL mound top face slide go-down come

hua **jin** le yi ge shandong.
slide **enter-J** PFV one CL tunnel

[0901MANCT]

“A toy car slid down from the top of a mound (and) slid **into** a tunnel.”

(83) tuqiu shang de wanjuche cong gao chu wang di chu
mound top DE toy-vehicle from high place toward low place

jin **ru** suidao.
enter-J **enter-R** tunnel

[0901MANZM]

“The toy vehicle on the mound moves from the top toward the bottom and **enters** the tunnel.”

(84) you yi ge wanjuche cong di chu
have one CL toy-vehicle from low place

wang xiaoqiu gao chu de suidao nei daotui shi **ru**
toward small-hill high place DE tunnel inside back-up drive **enter-R**

[0903MANZM]

“There is a toy vehicle backing up from the bottom **into** a tunnel on the small hill.”

(85) yi ge wanjuche pa shang yi ge xiepuo
one CL toy-vehicle climb go-up one CL slope

jìn *ru* le yī gè suǐdào.
enter-J *enter-R* PFV one CL tunnel

[0904MANCT]

“A toy car climbed up a slope (and) *entered* a tunnel.”

(86) yī tài wánjùchē dàotuí yóu dī chū
 one CL toy-vehicle back-up from low place

jìn *ru* le gāo chū de suǐdào lǐ.
enter-J *enter-R* PFV high place DE tunnel inside

[0904MANZM]

“A toy vehicle backed up from the bottom *into* a tunnel on the top.”

(87) yī gè nuǎizǐ jiāng wánjùchē fāng zài dī shàng,
 one CL girl JIANG toy-vehicle put be-at ground top

wǎng xié shàng fāng tuī *jìn* yī gè shàngōng.
 toward slant top direction push *enter-J* one CL tunnel

[0905MANCT]

“A girl puts a toy car on the ground (and) pushes (it) in an oblique, upward direction *into* a tunnel.”

(88) xiǎonǚhái jiāng wánjùqìchē yóu túdūi gāo chū tuī *ru* suǐdào.
 little-girl JIANG toy-car from mound high place push *enter-R* tunnel

[0905MANZM]

“The little girl pushes the toy car from the top of the mound *into* the tunnel.”

(89) yī gè nuǎizǐ nǎ le yī gè wánjùchē,
 one CL girl take PFV one CL toy-vehicle

bā wánjùchē tuī *jìn* shàngōng lǐ tóu.
 BA toy-vehicle push *enter-J* tunnel inside head

[0906MANCT]

“A girl has taken a toy car (and) pushed the toy car *into* the tunnel.”

(90) yī gè xiǎohái jiāng wánjùqìchē tuī *ru* le suǐdào lǐ.
 one CL child JIANG toy-car push *enter-R* PFV tunnel inside

[0906MANZM]

“A child pushed the toy car *into* the tunnel.”

(91) yī gè chuān lǜsè yīfú de xiǎonǚhái jiāng shǒu shàng
 one CL wear green clothes DE little-girl JIANG hand top

de yī gè wánjùchē sòng *jìn* yī gè suǐdào lǐ tóu.
 DE one CL toy-vehicle send *enter-J* one CL tunnel inside head

[0908MANCT]

“A little girl in a green shirt sends a toy car in her hand *into* a tunnel.”

- (92) yi ge xiaohai zai wan wanjuqiche, ba ta cong tudui xiapuo chu
 one CL child PROG play toy-vehicle BA 3rd from mound down-hill place
 wang tudui shang mian de suidao zhong tui jin.
 toward mound top face DE tunnel middle push enter-J [0908MANZM]

“A child is playing with a toy car and pushing it from the bottom of the mound toward the inside of a tunnel on the mound.”

- (93) yi ke qiu fei jin yi ge lanqiukuang li tou
 One CL ball fly enter-J one CL basketball-hoop inside head
 diao xia lai.
 fall go-down come [1006MANCT]

“A ball flies *into* a basketball hoop (and) falls down.”

- (94) yi ge fenhongse de qiu jin ru dao lanqiukuang li
 One CL pink DE ball enter-J enter-R arrive basket-hoop inside
 diao xia lai.
 fall go-down come [1007MANCT]

“A pink ball *enters* the basketball hoop (and) falls down.”

- (95) you yi ke qiu bei tou ru le lankuang nei.
 Have one CL ball BEI throw enter-R PRV hoop inside [1007MANZM]

“A ball was thrown *into* the hoop.”

- (96) yi ge nanhaizi jiang ta shou shang de yi ke qiu
 One CL boy JIANG 3rd hand top DE one CL ball
 diu jin qian fang de lanqiukuang li tou.
 throw enter-J front direction DE basketball-hoop inside head [1008MANCT]

“A boy throws a ball in his hands *into* the basketball hoop in front of him.”

- (97) yi ge nanhaizi zhan zai lanqiukuang qian mian,
 One CL boy stand be-at basketball-hoop front face
 jiang ta shou shang de qiu diu jin lankuang li tou.
 JIANG 3rd hand top DE ball throw enter-J hoop inside head

[1009MANCT]

“A boy is standing in front of the basketball hoop. (He) throws the ball in his hands *into* the hoop.”

(98) xiaohai na qiu wang qiukuang li toushe,
Child take ball toward hoop inside throw

qiu jin ru le qiukuang.
ball *enter-J* *enter-R* PFV hoop

[1009MANZM]

“The child took the ball and threw it toward the inside of the hoop. The ball *entered* the hoop.”

30 utterances with only *dao* (arrive)

(99) yi zhi niao cong yi ge muzhalan shang
One CL bird from one CL wooden-fence top

fei *dao* yi qun shu de shang fang.
fly *arrive* one group tree DE top direction

[0104MANSD]

“A bird flies from the top of a wooden fence *to* the top of a group of trees.”

(100) zhan zai zhalan shang de xiaoniao
Stand be-at fence top DE bird

fei *dao* le yuan chu de shuzhi shang.
fly *arrive* PFV far place DE branch top

[0104MANZM]

“The birdie that stood on the fence flew *to* the top of a tree branch in the distance.”

(101) yi zhi niao cong hou fang de shulin
One CL bird from behind direction DE woods

fei *dao* qian fang de muzhalan shang.
fly *arrive* front direction DE wooden-fence top

[0105MANSD]

“A bird flies from the woods in the back *to* the top of a wooden fence in the foreground.”

(102) yi ge shulin li tou de yi zhi niao fei *dao* ta qian fang
One CL woods inside head DE one CL bird fly *arrive* 3rd front direction

de yi ge muzhalan shang mian, ting zai muzhalan shang mian.
DE one CL wooden-fence top face stop be-at wooden-fence top face

[0105MANCT]

“A bird inside a forest flies *to* the top of a wooden fence that is in front of it and (it) stops on top of the wooden fence.”

(103) yuan chu shu shang de xiaoniao fei **dao** jin chu de zhalan shang.
 Far place tree top DE little-bird fly **arrive** near place DE fence top
 [0105MANZM]

“The birdie on the tree in the distance flies **to** the top of a nearby fence.”

(104) heliu zuo bian guanmu shang de yi zhi niao
 River left side bush top DE one CL bird
 fei **dao** heliu you bian de ling yi ke guanmu shang
 fly **arrive** river right side DE other one CL bush top [0111MANSD]

“A bird on the bush to the left of the river flies **to** another bush to the right of the river.”

(105) you yi zhi niao cong yuan chu de shu kuayue heliu
 Have one CL bird from far place DE tree go-across river
 fei **dao** le jin chu de shu shang.
 fly **arrive** PFV near place DE tree top [0111MANZM]

“A bird flew from a tree in the distance, crossed the river, and **arrived** at the top of a nearby tree.”

(106) yi zhi niao cong heliu you fang de guanmucong
 One CL bird from river right direction DE bush
 fei **dao** heliu zuo fang de guanmucong shang
 fly **arrive** river left direction DE bush top [0112MANSD]

“A bird flies from the bush on the right side of the river **to** the bush on the left side of the river.”

(107) zhe niao jiu likai ta, zhe ge xiaonuhazi de shou,
 This bird then leave 3rd this CL little-girl DE hand
 fei **dao** yi ge liba shang mian
 fly **arrive** one CL fence top face [0120MANCT]

“This bird then leaves her, this little girl's hands, (and) flies **to** the top of a fence.”

(108) you yi ge xiaohai ba niao yefang rang ta chuanyue heliu
 Have one CL child BA bird release let 3rd go-across river
 wang qian fang fei **dao** zhalan chu.
 toward front direction fly **arrive** fence place [0120MANZM]

“A child releases the bird, and lets it cross the river and fly forward **to** the fence.”

(109) heliu you fang de nusheng jiang yi zhi niao fangsheng
River right direction DE girl JIANG one CL bird release

dao heliu zuo fang shanpuo shang de muzhalan shang.
arrive river left direction hill top DE wooden-fence top

[0122MANSD]

“The girl to the right of the river releases a bird *to* the top of a wooden fence on a hill to the left of the river.”

(110) xiaonuhai yefang xiaoniao, xiaoniao chuanyue heliu,
Little-girl release little-bird little-bird go-across river

fei *dao* tuqiu zhalan shang.
fly *arrive* mound fence top

[0122MANZM]

“The little girl releases the birdie. The birdie crosses the river and flies onto the fence on the mound.”

(111) yi zhi niao bei yi ge zhan zai heliu you bian de nusheng
One CL bird BEI one CL stand be-at river right side DE girl

fangsheng *dao* heliu zuo bian de yi ge zhalan shang.
release *arrive* river left side DE one CL fence top

[0124MANSD]

“A bird is released *to* the top of a fence to the left of the river by a girl who is standing on the right side of the river.”

(112) yi zhi niao bei heliu you fang de nusheng
One CL bird BEI river right direction DE girl

fangsheng *dao* zuo bian xiaopuo shang de muzhalan shang.
release *arrive* left side hill top DE wooden-fence top

[0126MANSD]

“A bird is released by the girl on the right side of the river *to* the top of a wooden fence on a hill to the left.”

(113) yi ge shanpuo shang de nuhai jiang zhifeiji
One CL hill top DE girl JIANG paper-plane

she *dao* ta qian fang de feizhilou li mian.
shoot *arrive* 3rd front direction DE waste-basket inside face

[0209MANSD]

“A girl on the hill throws the paper airplane *into* the waste basket in front of her.”

(114) yi ge nusheng jiang yi ge zhifeiji she *dao* ta qian fang
One CL girl JIANG one CL paper-plane shoot *arrive* 3rd front direction

xiaopuo shang mian zhuang zhe feizhi de lesetong li.
hill top face contain PROG scrap-paper DE trash-can inside

[0210MANSD]

“A girl throws a paper airplane *into* a trash can that contains scrap paper on top of the hill in front of her.”

(115) yi ge nuhaizi jiang shou shang de zhifeiji wang qian diu
One CL girl JIANG hand top DE paper-plane toward front throw

diu dao tudui shang.
throw *arrive* mound top

[0216MANCT]

“A girl throws the paper plane on her hand forward and onto the mound.”

(116) shanpuo shang de yi ge nuhai jiang zhifeiji
Hill top DE one CL girl JIANG paper-plane

she dao you bian de yi ge guanmucong shang.
shoot *arrive* right side DE one CL bush top

[0217MANSD]

“A girl on the hill throws the paper plane *to* the top of a bush on the right.”

(117) yi ge nuhaizi shou shang na le yi ge zhifeiji,
One CL girl hand top take PFV one CL paper-plane

ba zhifeiji diu dao yi ke shu shang.
BA paper-plane throw *arrive* one CL tree top

[0218MANCT]

“A girl took a paper plane in her hand. (She) threw the paper plane onto a tree.”

(118) liang ge haizi zhan zai yi ge shikuai shang mian,
Two CL child stand be-at one CL rock top face

nanhaizi jiang nuhaizi wang qian tui dao shui li tou.
boy JIANG girl toward front throw *arrive* water inside head

[0508MANCT]

“Two kids are standing on a rock. The boy pushes the girl forward into the water.”

(119) shuichi pangbian de xiaopuo shang
Pond beside DE hill top

yi ge nanhai jiang qian fang de nuhai tui dao shuichi li.
one CL girl JIANG front direction DE girl push *arrive* pond inside

[0512MANSD]

“On top of the hill next to the pond, a boy pushes the girl before him *into* the pond.”

(120) yi ge shuichi shang zhan le yi nan yi nu,
 One CL pond top stand PFV one man one woman
 nan de cong nusheng hou fang jiang ta tui **dao** shuichi li.
 man DE from girl behind direction JIANG 3rd push **arrive** pond inside
 [0513MANSD]
 “A man and a woman are standing above a pond. From behind the girl, the man pushes her *into* the pond.”

(121) yi zhi e zou **dao** dashikuai shang de chongwulan nei.
 One CL goose walk **arrive** big-rock top DE pet-pen inside
 [0606MANSD]
 “A goose walks *into* the pet pen on top of the big rock.”

(122) yi ge dashikuai shang you yi zhi e zou **dao**
 One CL big-rock top have one CL goose walk **arrive**
 shikuai xia fang de yi ge chongwulan nei.
 rock down direction DE one CL pet-pen inside [0608MANSD]
 “On a big rock there is a goose walking *into* a pet pen below the rock.”

(123) yi ge nanhai ba yi zhi e fang **dao** shanpuo shang fang
 One CL boy BA one CL goose put **arrive** hill top direction
 de yi ge chongwulan nei.
 DE one CL pet-pen inside [0615MANSD]
 “A boy puts a goose *into* a pet pen on top of the hill.”

(124) shanpuo shang de nanhai jiang shou zhong de e
 Hill top DE boy JIANG hand middle DE goose
 bao **dao** shanpuo xia fang de chongwulan nei.
 hug **arrive** hill down direction DE pet-pen inside [0617MANSD]
 “The boy on top of the hill carries the goose in his hands *into* the pet pen below the hill.”

(125) baba yi ba ba xiaohai cong liuhuati shang
 Father one hold BA child from slide top
 tui **dao** le liuhuati xia.
 push **arrive** PFV slide down [0705MANZM]
 “The father pushed the child off the top of the slide *to* the bottom of the slide with one push.”

(126) yi ge daren jiang yi ge xiaohai cong liuhuati de shang fang
 One CL adult JIANG one CL child from slide DE top direction
 hua **zhi** liuhuati de xia fang.
 slide **arrive-Z** slide DE down direction [0707MANSD]

“An adult slides a child from the top of the slide *to* the bottom of the slide.”

(127) yi ge fenhongse de qiu ziji fei **dao** lankuang li.
 One CL pink DE ball self fly **arrive** hoop inside [1007MANSD]

“A pink ball flies *into* the basket on its own.”

(128) yi ge fenhongse de qiu bei yi ge nansheng
 One CL pink DE ball BEI one CL boy
 diu **dao** lankuang li
 throw **arrive** hoop inside [1009MANSD]

“A pink ball is thrown *into* the basket by a boy.”

53 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a directional phrase equivalent to *facing* or *toward*.

32 Preverbal: Directional Morpheme + XP_{LOC} + V.

(129) yuan chu shu shang de xiaoniao **wang** qian fang zhalan **feixing**.
 Far place tree top DE little-bird **toward** front direction fence **fly**
 [0103MANZM]

“The birdie on the tree in the distance *flies toward* the fence in the foreground.”

(130) yuan chu de xiaoniao kuayue heliu
 Far place DE little-bird go-across river
wang jin chu de shu shang **fei**
toward near place DE tree top **fly** [0109MANZM]

“The birdie in the distance crosses the river and *flies toward* the top of a nearby tree.”

(131) heliu you fang xiaopuo shang de nuhai
 River right direction hill top DE girl
 jiang shou zhong de niao **wang** heliu zuo fang
 JIANG hand middle DE bird **toward** river left direction

de muzhalan de fangxiang *fangsheng*.
DE wooden-fence DE direction *release* [0119MANS D]

“A girl on the mound on the right side of the river *releases* the bird in her hands in the direction of a wooden fence on the left side of the river.”

(132)you yi ge xiaohai ba niao yefang
Have one CL child BA bird release

rang ta chuanyue heliu
let 3rd go-through river

wang qian fang *fei* dao zhalan chu.
toward front direction *fly* arrive fence place [0120MANZ M]

“A child releases the bird, and lets it cross the river and *fly forward to the fence*.”

(133)heliu you fang de nusheng jiang yi zhi niao
River right direction DE girl JIANG one CL bird

wang heliu zuo fang de shikuai shang de
toward river left direction DE rock top DE

muzhalan de fangxiang *fangsheng*.
wooden-fence DE direction *release* [0121MANS D]

“The girl to the right of the river *releases* a bird in the direction of a wooden fence on a rock to the left of the river.”

(134)heliu pangbian de shanpuo shang you ge nusheng
River beside DE hill top have CL girl

jiang niao *wang* heliu zuo fang
JIANG bird *toward* river left direction

de zhalan de fangxiang *fangsheng*.
DE fence DE direction *release* [0123MANS D]

“On the hill beside the river is a girl *releasing* the bird in the direction of a fence to the left of the river.”

(135)yuan chu de xiaohai jiang xiaoniao *wang* qian fang
Far place DE child JIANG little-bird *toward* front direction

muzhalan *yefang*, xiaoniao chuanyue heliu
wooden-fence *release* little-bird go-through river

ting zai qian fang de muzhalan shang.
stop be-at front direction DE wooden-fence top [0123MANZM]

“The child in the distance *releases* the birdie in the direction of the wooden fence in the foreground. The birdie crosses the river and stops on top of the wooden fence in the foreground.”

(136)yi ge nuhai jiang yi zhi niao *wang* he dui mian
One CL girl JIANG one CL bird *toward* river opposite face

de zhalan de fangxiang *fangsheng*.
DE fence DE direction *release* [0125MANS D]

“A girl *releases* a bird in the direction of the fence across the river.”

(137)you yi ge xiaohai jiang xiaoniao yefang
Have one CL child JIANG little-bird release

kuayue heliu *wang* qian fang de zhalan chu *fei*.
go-across river *toward* front direction DE fence place *fly* [0125MANZM]

“A child releases the birdie. It crosses the river and *flies toward* the fence in the foreground.”

(138)yi ge nuhaizi jiang ta shou shang de zhifeiji
One CL girl JIANG 3rd hand top DE paper-plane

wang shang *diu*.
toward top *throw* [0207MANCT]

“A girl *throws* the paper plane on her hand upward.”

(139)yi ge xiaohai zhan zai yuan fang de tuqiu
One CL child stand be-at far direction DE mound

na zhe zhifeiji *wang* qian *toushe*.
take PROG paper-plane *toward* front *shoot* [0208MANZM]

“A child is standing on the mound in the distance, holding a paper plane and *throwing* it forward.”

(140)yi ge nuhaizi na le zhifeiji *wang* qian *diu*,
One CL girl take PFV paper-plane *toward* front *throw*

zhifeiji diao jin yi ge tongzi li.
paper-plane fall enter one CL bucket inside [0210MANCT]

“A girl took the paper plane and *threw it forward*. The paper plane fell into a bucket.”

- (141)you yi ge xiaohai jiang zhifeiji **wang** qian fang
 Have one CL child JIANG paper-plane **toward** front direction
 tudui shang de lesetong zhong **she**,
 mound top DE trash-can middle **shoot**
 feiji she ru le lesetong li.
 paper shoot enter-R PFV trash-can inside [0210MANZM]

“A child **threw** the paper airplane **toward** the inside of the trash can on the mound in front of her. The airplane was thrown into the trash can.”

- (142)you yi ge xiaohai zhan zai tuqiu gao chu
 Have one CL child stand be-at mound high place
 na zhe zhifeiji **wang** yuan fang **toushe**.
 take PROG paper-plane **toward** far direction **shoot** [0215MANZM]

“There is a child standing on top of the mound. She **throws** a paper plane into the distance.”

- (143)yi ge nuhaizi jiang shou shang de zhifeiji **wang** qian **diu**
 One CL girl JIANG hand top DE paper-plane **toward** front **throw**
 diu dao tudui shang.
 throw arrive mound top [0216MANCT]

“A girl **throws** the paper plane on her hand **forward** and onto the mound.”

- (144)yi ge xiaohai na zhe zhifeiji
 One CL child take PROG paper-plane
wang yuan chu de tuqiu **toushe**.
toward far place DE mound **shoot** [0216MANZM]

“A child was holding a paper plane and then **threw** it **toward** a mound in the distance.”

- (145)you yi ge xiaohai jiang zhifeiji
 Have one CL child JIANG paper-plane
wang yuan fang de shu shang **toushe**,
toward far direction DE tree top **shoot**
 zhifeiji ting zai yuan chu de shuzhi shang
 paper-plane stop be-at far place DE branch top [0217MANZM]

“There is a child **throwing** the paper plane **toward** a tree in the distance. The paper plane stops on a tree branch in the distance.”

(146) yi ge xiaohai zhan zai yuan chu,
One CL child stand be-at far place

chao zhe jin chu shanqiu shang de dashu
toward PROG near place hill top DE big-tree

she le yi ge zhifeiji, ranhou zhifeiji ting zai shu shang.
shoot PFV one CL paper-plane then paper-plane stop be-at tree top

[0218MANZM]

“A child is standing in the distance. She *threw* a paper plane in the direction of a big tree on a nearby hill, and then the paper plane stopped on top of the tree.”

(147) yi zhi e zou shang tudui, *wang* zhalan fangxiang *zou*.
one CL goose walk go-up mound *toward* fence direction *walk*

[0605MANCT]

“A goose walks up the mound (and) *walks* in the direction of the fence.”

(148) you yi zhi e *chao* zhe tuqiu shang de
Have one CL goose *toward* PROG mound top DE

banyuanxing mucao zhong *yidong*
semi-circular wooden-container middle *move*

[0605MANZM]

“There is a goose *moving toward* the inside of a semi-circular wooden container on top of the mound.”

(149) yi zhi e zhan zai yi ge datudui shang mian,
one CL goose stand be-at one CL big-mound top face

wang yi ge mupen li tou de fangxiang *huaxing*
toward one CL wooden-basin inside head DE direction *slide*

[0607MANCT]

“A goose is standing on a big mound. (It) *slides toward* the inside of a wooden basin.”

(150) shanqiu shang de yazi cong gao chu *wang* di chu
hill top DE duck from high place *toward* low place

de banyuanxing mucao nei *yidong*.
DE semi-circular wooden-container inside *move*

[0607MANZM]

“The duck on the hill *moves* from the high area *toward* the semi-circular wooden container that is in the low area.”

(151) you yi ge xiaohai bao zhe yi zhi e *wang* tuqiu gao chu
have one CL child hug PROG one CL goose *toward* mound high place

de banyuanxing zhalan zhong **zou.**
DE semi-circular fence middle **walk** [0614MANZM]

“A child **walks toward** a semi-circular fence on the top of the mound while holding a goose.”

(152) xiaohai bao zhe e **wang** tuqiu shang de
child hug PROG goose **toward** mound top DE

banyuanxing mucao nei **zou**
semi-circular wooden-container inside **walk**

ranhou ba e fang ru le mucao nei
then BA goose put enter-R PFV wooden-container inside [0615MANZM]

“The child **walked toward** a semi-circular wooden container on the mound while holding a goose and then put the goose into the wooden container.”

(153) you yi ge xiaohai bao zhe yi zhi e cong tudui gao chu
have one CL child hug PROG one CL goose from mound high place

wang tudui xia fang de
toward mound down direction DE

matixing kafeise zhalan chu **zou**
horseshoe-shaped brown fence place **walk** [0616MANZM]

“A child **walks** from the top of a mound **toward** a horseshoe-shaped, brown fence below the mound while holding a goose.”

(154) baba fu zhe xiaohai rang ta cong liuhuati shang
father support PROG child let 3rd from slide top

huanhuan **wang** xia **hua.**
slowly **toward** down **slide** [0706MANZM]

“The father is supporting the child and letting him **slide** down slowly from the top of the slide.”

(155) yi ge nuhai jiang yi ge wanju che cong you bian de shanpuo
Have CL girl JIANG one CL toy-vehicle from right side DE hill

xiang xia **tui** wang zuo bian de yi ge shandong.
toward down **push** toward left side DE one CL tunnel

[0905MANSJ]

“A girl **pushes** a toy vehicle **downward**, from the hill on the right toward a tunnel on the left.”

- (156) zhe ge nuhaizi ne, jiang na wanjuche **wang** shang **tui**,
 This CL girl PART JIANG that toy-vehicle **toward** top **push**
 xiang ba ta tui dao yi ge shandong li.
 want BA 3rd push arrive one CL tunnel inside [0907MANCT]

“As for this girl, (she) **pushed** that toy car **upward**, wanting to push it into a tunnel.”

- (157) you yi ge xiaohai jiang wanjuqiche cong tudui xia fang
 Have one CL child JIANG toy-vehicle from mound down direction
wang tudui shang fang suidao chu **tui** **dong**.
toward mound top direction tunnel place **push** **move** [0907MANZM]

“There is a child **pushing** a toy car from the bottom of the mound **toward** a tunnel on the mound.”

- (158) yi ge nuhai jiang yi liang wanjuche
 One CL girl JIANG one CL toy-vehicle
wang shang **tui** xiang yi ge shuiguan nei.
toward top **push** toward one CL pipe inside [0908MANSD]

“A girl **pushes** a toy vehicle **upward** and toward the inside of a tube.”

- (159) you yi ge xiaohai na zhe qiu **wang** lankuang **tou**.
 Have one CL child take PROG ball **toward** hoop **shoot**
 [1008MANZM]

“A child took the ball and **threw** it **toward** the hoop.”

- (160) xiaohai na qiu **wang** qiukuang li **toushe**,
 child take ball **toward** hoop inside **shoot**
 qiu jin ru le qiukuang.
 ball enter-J enter-R PFV hoop [1009MANZM]

“The child took the ball and **threw** it **toward** the inside of the hoop. The ball entered the hoop.”

21 Postverbal: *Directional Morpheme* + XP_{LOC} + V.

- (161) you hou fang de shulin shang you yi zhi niao
 Right behind direction DE woods top have one CL bird
fei **wang** zuo qian fang de muzhalan.
fly **toward** left front direction DE wooden-fence [0103MANSD]

“On top of the woods on the right and in the back, there is a bird *flying toward* the fence on the left and in the foreground.”

(162) yi ge niao zhan zai yi ge shulin shang,
One CL bird stand be-at one CL woods top

fei xiang qian fang de muzhalan.
fly toward front direction DE wooden-fence

[0103MANCT]

“A bird is standing on top of a forest and it *flies toward* the wooden fence in front of it.”

(163) yi zhi niao zhan zai zhalan shang mian, you qifei,
One CL bird stand be-at fence top face then take-off

fei xiang zuo qian fang de yi ge shulin shang mian
fly toward left front direction DE one CL woods top face

[0104MANCT]

“A bird is standing on the fence, and then (it) takes off, and *flies toward* the top of a forest that is on its left and in front of it.”

(164) heliu zuo bian guanmucong shang de yi zhi niao
River left side bush top DE one CL bird

fei xiang heliu you bian de guanmucong.
fly toward river right side DE bush

[0109MANS D]

“A bird on top of the bush to the left of the river *flies toward* the bush to the right of the river.”

(165) heliu you fang yi ge guanmucong shang de niao
River right direction one CL bush top DE bird

fe xiang heliu zuo fang de guanmucong.
fly toward river left direction DE bush

[0110MANS D]

“A bird on top of a bush to the right of the river *flies toward* the bush to the left of the river.”

(166) jin chu shuzhi shang de xiaoniao chuanyue heliu
Near place branch top DE little-bird go-through river

fei wang yuan fang shu shang ting xia.
fly toward far direction tree top stop go-down

[0112MANZM]

“The birdie on a nearby tree branch crosses the river, *flies toward* a tree in the distance, and stops there.”

(167) jin chu zhan zai tuqiu gao chu de xiaohai
Near place stand be-at mound high place DE child

bao zhe yi zhi niao, ranhou yefang rang ta chuan yue heliu
hug PROG one CL bird then release let 3rd go-through river

fei wang yuan fang zhalan fangxiang.
fly toward far direction fence direction

[0119MANZM]

“The child who is standing high up on the mound close by is holding a bird, and then she releases it and lets it cross the river and fly toward the fence in the distance.”

(168) yi ge nuhai jiang yi zhi niao fangsheng,
One CL girl JIANG one CL bird release

na zhi niao fei xiang he lingwai yi bian de zhalan shang.
that CL bird fly toward river other one side DE fence top

[0120MANSD]

“A girl releases a bird. That bird flies toward the top of the fence on the other side of the river.”

(169) yi ge nuhai jiang zhifeiji she xiang
One CL girl JIANG paper-plane shoot toward

ta you qian fang de shitou.
3rd right front direction DE rock

[0216MANSD]

“A girl *throws* the paper plane in the direction of a rock that is in front of her and to her right.”

(170) shuichi zuo fang you yi kuai shitou shang zhan le yi nan
Pond left direction have one CL rock top stand PFV one man

yi nu, nan de jiang nu de tui xiang shuichi.
one woman man DE JIANG woman DE push toward pond

[0507MANSD]

“To the left of the pond there is a rock on which a man and a woman are standing. The man pushes the woman toward the pond.”

(171) yi zhi zhan zai dashikuai shang de e
One CL stand be-at big-rock top DE goose

zou xiang shikuai xia fang de chongwulan.
walk toward rock down direction DE pet-pen

[0607MANSD]

“A goose that was standing on the big rock is *walking toward* the pet pen below the rock.”

(172) yi ge nanhai bao zhe yi zhi e
 One CL boy hug PROG one CL goose
 zou xiang shanpuo shang de chongwuln.
 walk toward hill top DE pet-pen [0614MANSD]

“A boy *walks toward* the pet pen on top of the hill while holding a goose.”

(173) yi ge ren bao zhe yi zhi e cong shanpuo shang
 One CL person hug PROG one CL goose from hill top
 zou xiang xia mian de yi ge yuanzhuang de difang.
 walk toward down face DE one CL round DE place [0616MANSD]

“A person *walks* from the top of the hill *toward* a circular place below while holding a goose.”

(174) yuan fang tuqiu shang de xiaohai bao zhe e
 Far direction mound top DE child hug PROG goose
 zou xiang le jin fang banyuanxing mucao nei
 walk toward PFV near direction semi-circular wooden-container inside
 bing jiang e fang ru mucao zhong.
 and JIANG goose put enter-R wooden-container middle [0617MANZM]

“A child on the mound in the distance *walked toward* a nearby semi-circular wooden container while holding a goose and then put the goose into the wooden container.”

(175) yi liang wanjuche ziji cong shikuai shang fang
 One CL toy-vehicle self from rock top direction
 hua xiang zhi xia fang de suidao nei.
 slide toward arrive-Z down direction DE tunnel inside [0902MANSD]

“A toy vehicle *slides* on its own from the top of the rock into the tunnel below.”

(176) yi ge wanjuche ziji
 One CL toy-vehicle self
 zou xiang qian fang shanpuo shang de shandong.
 walk toward front direction hill top DE tunnel [0903MANSD]

“A toy vehicle *moves* on its own *toward* the tunnel on the hill in front of it.”

(177) yi ge nuhai jiang yi ge wanjuche
 One CL girl JIANG one CL toy-vehicle

cong you bian de shanpuo xiang xia
from right side DE hill toward down

tui *wang* zuo bian de yi ge shandong.
push toward left side DE one CL tunnel [0905MANSD]

“A girl *pushes* a toy vehicle downward, from the hill on the right *toward* a tunnel on the left.”

(178) yi ge nuhai jiang yi ge xiaopuo shang de wanjuche
One CL girl JIANG one CL small-slope top DE toy-vehicle

tui *xiang* pangbian de guanzhuangwu li.
push toward beside DE pipe-shaped-object inside [0906MANSD]

“A girl *pushes* a toy vehicle on a small hill *toward* the inside of a nearby tube-shaped object.”

(179) yi ge nuhai jiang yi ge wanjuche
One CL girl JIANG one CL toy-vehicle

tui *xiang* yi gen guanzhuangwu.
push toward one CL pipe-shaped-object [0907MANSD]

“A girl *pushes* a toy vehicle *toward* a tube-shaped object.”

(180) yi ge nuhai jiang yi liang wanjuche
One CL girl JIANG one CL toy-vehicle

wang shang *tui* *xiang* yi ge shuiguan nei.
toward top *push toward* one CL pipe inside [0908MANSD]

“A girl *pushes* a toy vehicle upward and *toward* the inside of a tube.”

(181) yi ge nansheng jiang yi ge fenhongse de qiu *diu* *xiang* lankuang
One CL boy JIANG one CL pink DE ball *throw toward* hoop [1008MANSD]

“A boy *throws* a pink ball *toward* the basket.”

6 utterances have no PATH, no *dao*, and no ingressive/egressive. They have a Manner-V and *zai* (be-at).

(182) yi ge nuhaizi zhan zai yi ge shidui shang mian,
One CL girl stand be-at one CL rock-pile top face

jiang ta shou shang de yi zhi niao wang qian fang chu,
JIANG 3rd hand top DE one CL bird toward front release exit

zhe ge niao ne jiu fei guo he
this CL bird PART then fly cross river

ting zai muzhalan shang mian.
stop be-at wooden-fence top face

[0124MANCT]

“A girl is standing on a rock. (She) sends a bird in her hands out and forward. This bird then flies over the river and stops on top of the wooden fence.”

(183) yi ge xiaohai zhan zai yuan chu de xiaotuqiu shang
One CL child stand be-at far place DE little-mound top

jiang xiaoniao yefang, chuanyue heliu
JIANG little-bird release go-through river

ting zai jin chu de mutou zhalan shang
stop be-at near place DE wood fence top

[0124MANZM]

“A child is standing on the small mound in the distance, and she releases the birdie. It crosses the river and stops on top of the nearby wooden fence.”

(184) yi ge nuhaizi zai he de lingwai yi bian,
One CL girl be-at river DE other one side

jiang shou shang de niao fang chu, niao fei guo he,
JIANG hand top DE bird release exit bird fly cross river

zhanli zai yi ge tudui shang mian de zhalan shang mian.
stand be-at one CL mound top face DE fence top face

[0126MANCT]

“A girl is on the other side of the river. (She) releases the bird in her hands. The bird flies across the river (and) stands on a fence on a mound.”

(185) yuan chu de xiaohai jiang xiaoniao yefang rang ta kuayue heliu
Far place DE child JIANG little-bird release let 3rd go-over river

ting zai jin chu de muzhalan shang.
stop be-at near place DE wooden-fence top

[0126MANZM]

“The child in the distance releases the birdie, and lets it cross the river and stop on top of the nearby wooden fence.”

(186) yi ge nusheng jiang yi ge zhifeiji
One CL girl JIANG one CL paper-plane

she zai shanpuo shang de guanmucong shang.
shoot be-at hill top DE bush top

[0218MANSND]

“A girl throws a paper plane onto the bush on the hill.”

(187) yi ge xiaohai zhan zai yuan chu,
One CL child stand be-at far place

chao zhe jin chu shanqiu shang de dashu
toward PROG near place hill top DE big-tree

she le yi ge zhifeiji, ranhou zhifeiji *ting zai* shu shang.
shoot PFV one CL paper-plane then paper-plane *stop be-at* tree top
[0218MANZM]

“A child is standing in the distance. She threw a paper plane in the direction of a big tree on a nearby hill, and then the paper plane *stopped* on top of the tree.”

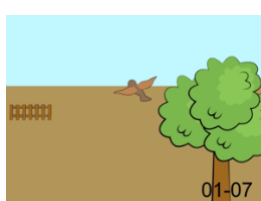
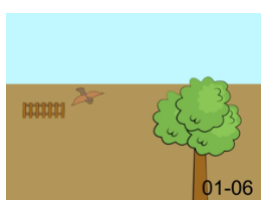
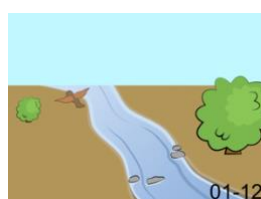
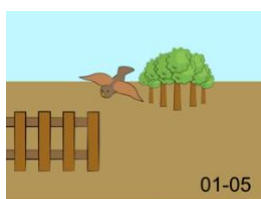
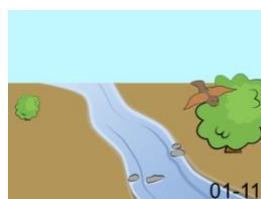
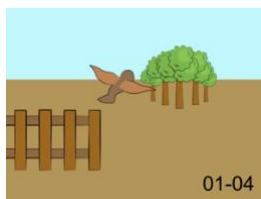
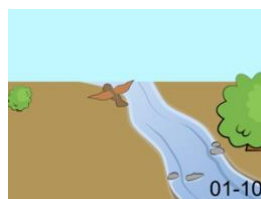
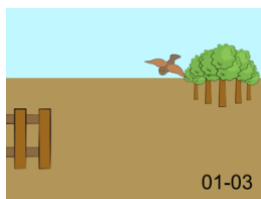
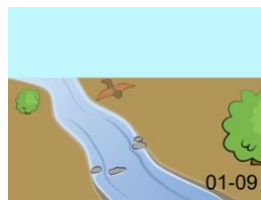
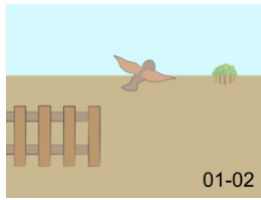
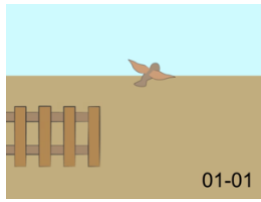
1 utterance has nothing but a Manner-V.

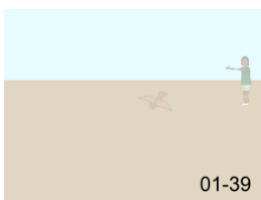
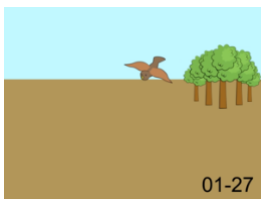
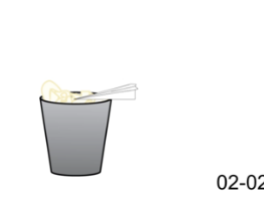
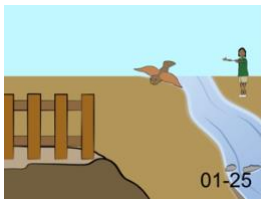
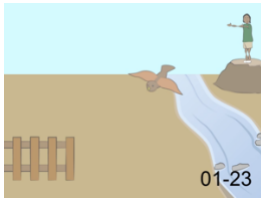
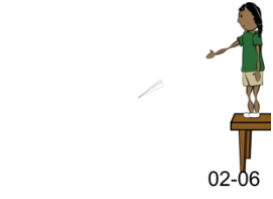
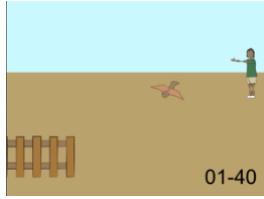
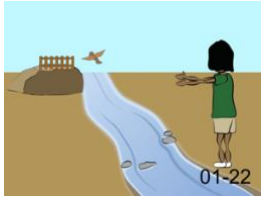
(188) yi ge nuhaizi zai yi ke qingxie de shu shang *paxing*.
One CL girl be-at one CL tilted DE tree top *climb*
[1301MANCT]

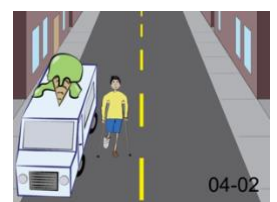
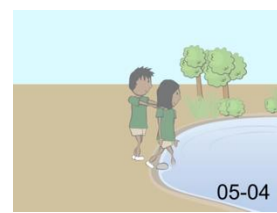
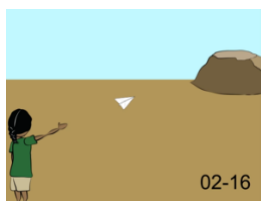
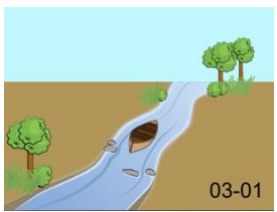
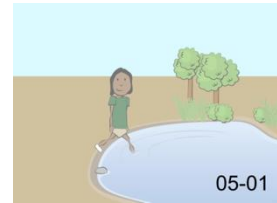
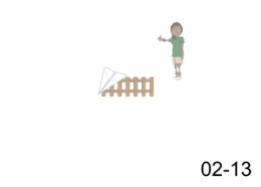
“A girl is *climbing* on a tree in a leaning position.”

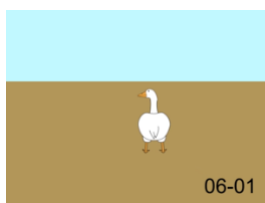
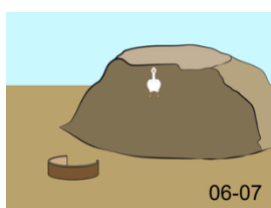
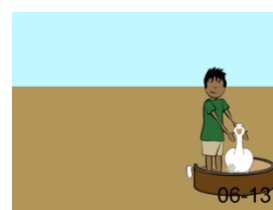
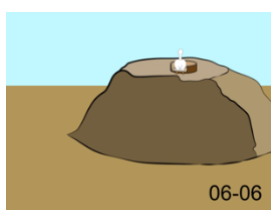
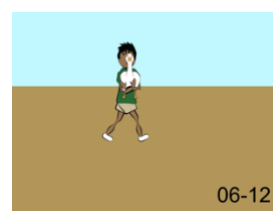
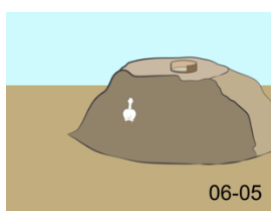
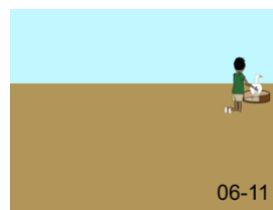
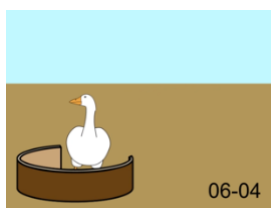
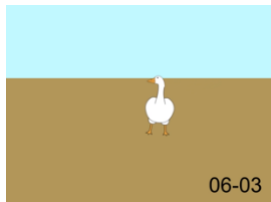
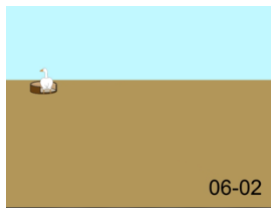
APPENDIX B. ANIMATED PROMPTS USED FOR ELICITATION

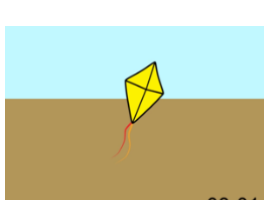
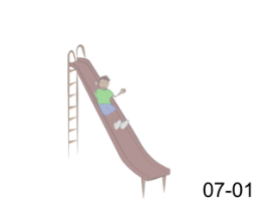
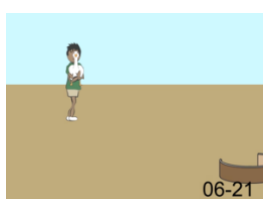
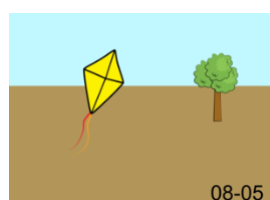
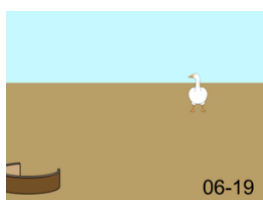
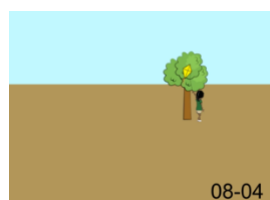
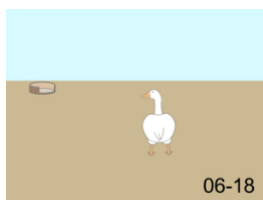
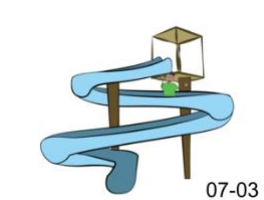
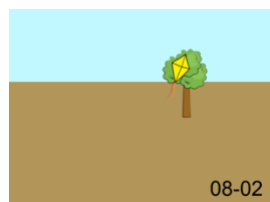
	ID Numbers of the prompts	Total Number of the prompts
Prompts that depict only the horizontal dimension	01-08, 01-13, 01-14, 02-01, 02-02, 02-03, 02-04, 02-11, 02-12, 02-19, 02-20, 05-01, 05-02, 05-04, 05-09, 15-05, 15-06, 15-09, 15-10	19
Prompts that depict only the vertical dimension	06-09, 10-12, 10-13, 11-04, 11-05, 11-06, 11-07, 11-08, 11-09, 11-10, 12-01, 12-02, 12-03, 13-02, 13-03, 13-04, 13-06, 13-07, 13-08, 15-02, 15-03, 15-04, 15-07, 15-08	24 *06-09 is included here, but it actually consists of two events: a vertical motion event immediately followed by a horizontal one.
Prompts that depict the deictic and horizontal dimensions	01-01, 01-02, 01-15, 01-16, 01-17, 01-18, 01-27, 01-39, 01-40, 01-41, 02-13, 02-14, 03-01, 03-02, 03-03, 03-04, 04-01, 04-02, 05-05, 05-06, 05-10, 05-11, 06-01, 06-02, 06-03, 06-04, 06-10, 06-11, 06-12, 06-13, 06-18, 06-19, 06-20, 06-21, 08-01, 08-02, 08-03, 08-04, 08-05, 08-06, 10-01, 10-02, 10-04, 10-05 The following prompts are officially marked as deictic and horizontal, but they all clearly depict motion events involving the vertical plane. In this dissertation, they are treated as depicting all three dimensions: (09-01, 09-02, 09-03, 09-04, 09-05, 09-06, 09-07, 09-08)	44 (52, counting the prompts from series 9.)
Prompts that depict the vertical and horizontal dimensions	02-05, 02-06, 07-03, 10-11, 10-14, 10-15, 11-02, 11-03	8
Prompts that depict all three dimensions	01-03, 01-04, 01-05, 01-06, 01-07, 01-09, 01-10, 01-11, 01-12, 01-19, 01-20, 01-21, 01-22, 01-23, 01-24, 01-25, 01-26, 02-07, 02-08, 02-09, 02-10, 02-15, 02-16, 02-17, 02-18, 05-07, 05-08, 05-12, 05-13, 06-05, 06-06, 06-07, 06-08, 06-14, 06-15, 06-16, 06-17, 07-01, 07-02, 07-04, 07-05, 07-06, 07-07, 10-06, 10-07, 10-08, 10-09, 13-01, 13-05 This dissertation treats the following prompts as depicting all three dimensions even though they are not officially marked as such: (09-01, 09-02, 09-03, 09-04, 09-05, 09-06, 09-07, 09-08)	49 (57, counting the prompts from series 9.)

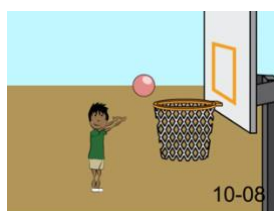
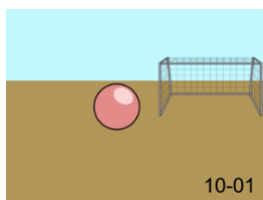
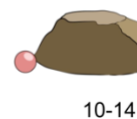
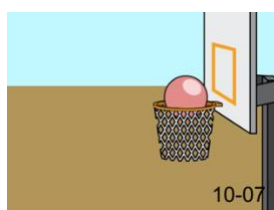
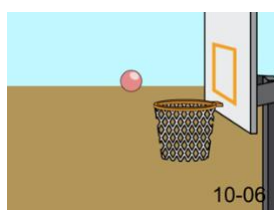
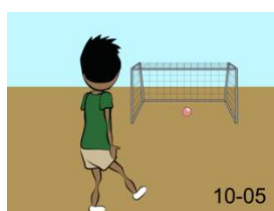
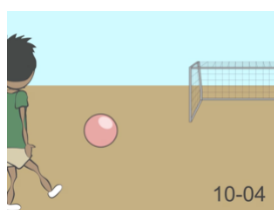
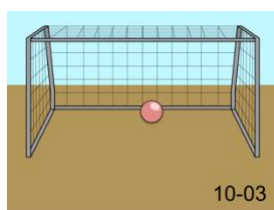
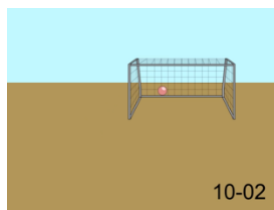










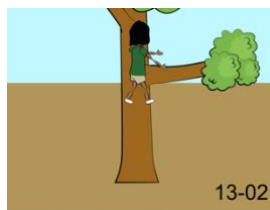




11-01



11-08



13-02



11-02



11-09



13-03



11-03



11-10



13-04



11-04



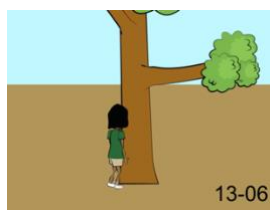
12-01



11-05



12-02



13-06



11-06



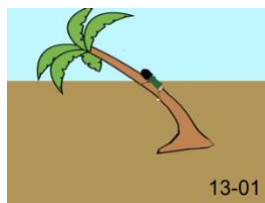
12-03



13-07



11-07



13-01



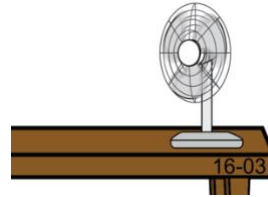
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14-01



15-06



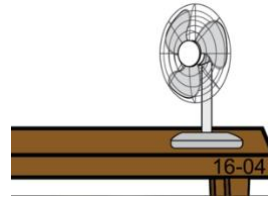
16-03



14-02



15-07



16-04



15-01



15-08



17-01



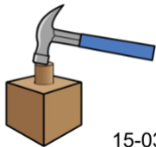
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15-09



17-02



15-03



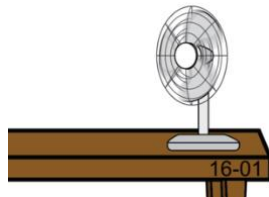
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17-03



15-04



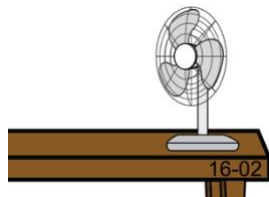
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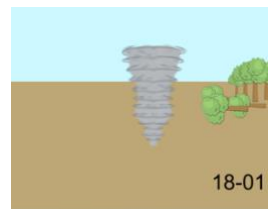
17-04



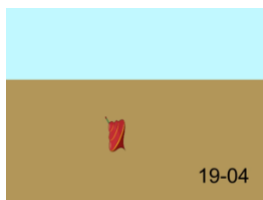
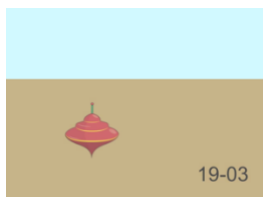
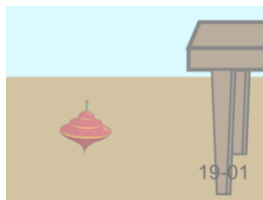
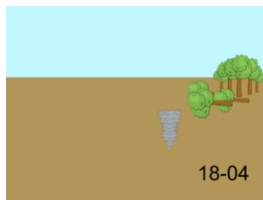
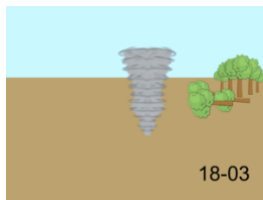
15-05



16-02



18-01



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