

# Focus interpretation of *zhi* 'only' associated arguments in Mandarin triadic constructions\*

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## *Abstract*

*Although contrastive stress in English facilitates context disambiguation, this paper shows that Taiwan Mandarin adult speakers were insensitive to contrastive stress in resolving ambiguity in zhi 'only' associated arguments in triadic constructions. The first experiment, which contained sixteen true/false responses to sentences containing zhi associated arguments inferred from corresponding narrated stories, was conducted to test the judgments of one hundred college students. The results showed that the direct object (DO) focus tended to be interpreted as the most prominent in both the dative and double object constructions, contra to the results attested in the dative construction by English-speaking adults in Gualmini et al. (2003) and Dutch children in Szendrői (2003), and the prediction of the VP default focus by Reinhart's (2006) focus interface strategy. The second experiment with a multiple-choice questionnaire of the same sixteen contexts as in the first experiment was designed for a different group of fifty-one participants to identify which element (indirect object (IO), DO or VP focus) was interpreted most prominently. The results again showed the correction rates of the DO focus were higher than those of the IO, and those of the default VP focus was the lowest, contra to Reinhart's prediction. The conspicuous nature of the DO focus in triadic constructions in both experiments is accounted for by its syntactic basicness to the predicate and its preferred thematic prominence over the IO. The DO focus surfaces in Mandarin in which stress is not lexically distinctive; hence prosody is not served as the primary cue for disambiguation.*

## **1. Introduction**

In the study of focus, it has been largely assumed in the literature that focus correlates with phonetic prominence, stress or accent. This pitch

accent is readily perceptible within a focused phrase, and even contributes to semantic disambiguation. In contrast with the widely-studied Indo-European languages, the issues regarding whether stress is phonologically represented and whether acoustic effects feed semantic disambiguation are less studied in Mandarin Chinese<sup>1</sup>, a tonal language. One main reason for this is that stress is not lexically distinctive in Chinese, despite the fact that Chinese does utilize stress to express emphasis, resulting in stress effects, such as longer durations, higher pitches, or louder intensity (e.g., Jin 1996; Liao 1996; Xu 1999, among many others). Even though native speakers of Chinese may recognize the emphatic effects, the previously mentioned issue concerning the utilization of stress to disambiguate sentences has not received much attention in the literature. Instead of tackling the first issue, the necessity of the phonological representation of stress, this paper empirically examines whether adult Taiwanese Mandarin speakers utilize contrastive stress to disambiguate *zhi* 'only' associated arguments in triadic (double object and dative) constructions. The first experiment, which contained true/false responses to sentences with *zhi* associated arguments which were based on the content of sixteen narrated stories, was conducted to test the judgments of one hundred college students. The results showed that the direct object (DO) focus tended to be interpreted most prominently in either type of construction, contra to the results of American adults in Gualmini et al. (2003) and Dutch children in Szendrői (2003). This result further challenges the VP default focus in these constructions in consideration of the interface strategy proposed by Reinhart (1995, 2006). To further test Reinhart's theory of interface strategy and reference-set computation, the second experiment with a multiple-choice format was designed to pinpoint which of the three (IO, DO, VP) foci in the same sixteen contexts were considered to be the most prominent by a different group of fifty-one college students. The results of the second experiment echoed those from the first one. Thus, Reinhart's (2006) reference-set computation that derives default focus interpretation, empirically evidenced by Szendrői's (2003) study, does not seem to be able to readily account for the Chinese data. It is suggested that for a language like Chinese in which stress is not lexically distinctive, prosody is not primarily employed for the resolution of ambiguity. Rather, other factors, such as thematic prominence, syntactic relation, or contextual information, are employed.

This paper is organized as follows. Section 2 reviews semantic discussions of focus association with *only*, the experimental reports of contrastive stress acquisition in the literature (in Section 2.2), and the relevant discussion of Chinese *zhi* sentences in Section 2.3. The methodology and results of experiment 1 are shown in Section 3. A follow-up experiment 2

is demonstrated in Section 4. Section 5 discusses possible accounts for the insensitivity to contrastive stress in sentence disambiguation and acknowledges limitations of the study. Section 6 concludes this paper.

## 2. Interpreting sentences with 'only'

### 2.1. Association with focus and focus alternatives

The rich study of focus in the literature, mainly drawing data from non-tonal languages, has generally assumed a correlation between phonetic prominence, stress or accent with the focus of a sentence, a phrase containing the intonation center e.g., Chomsky (1971, among others). The dependence of stress position on the choice of focus has been explicitly stated by Jackendoff (1972), as in (1) and exemplified in (2); namely, stress is a necessary condition for focus.

- (1) If a phrase P is chosen as the focus of a sentence S, the highest stress in S will be on the syllable of P that is assigned highest stress by the regular stress rules.  
(Jackendoff 1972: 237)
- (2) *Did Fred HIT Bill?*  
 a. *No, he KISSED him.*  
 b. *#No, he hit TOM.*  
 (Jackendoff 1972: 234)

The assumption that the focus, necessarily stressed, contributes to the semantic value in addition to the sentence's ordinary semantic value is deeply embedded in the discussion of the widely known phenomenon-association with focus, first articulated by Jackendoff (1972), in which a focus particle, e.g., *only*, associates with a focus element in its (c-commanding) scope, receiving the focal accent. The widely discussed example in (3), e.g., Rooth (1985, 1992), Kratzer (1991), Krifka (2006), among many others, is claimed to have *only* associated with either the objects or the VP, as in (4), signaled by a focal accent F and interpreted in (5a), (5b) and (5c), respectively.

- (3) *John only introduced Bill to Sue.*
- (4) a. *John only introduced [Bill]<sub>F</sub> to Sue.*  
 b. *John only introduced Bill to [Sue]<sub>F</sub>.*  
 c. *John only [introduced Bill to Sue]<sub>F</sub>.*

- (5) a. *The only person John introduced to Sue is Bill.*  
 b. *The only person John introduced Bill to is Sue.*  
 c. *The only thing that John did is introduce Bill to Sue.*

Under the consensus of the need for association with focus, the proposals that allow meaning to be sensitive to prosody largely fall into two camps: the Structured Meaning (SM) approach, (e.g., Jackendoff 1972; von Stechow 1983, 1991, etc.) and the Alternative Semantics theory as proposed by Rooth (1985, 1992). The former SM approach assumes that the focus-sensitive operator *only* has access to the inner structure of a proposition (the focus associate and its position within the scope of *only*). For example, (4a) and (4b) have the same denotation: the same proposition that *John introduced Bill to Sue*, derived by first substituting a variable ( $y$ ) for the focused phrase (giving the presupposition of the sentence), and then by the application of two different  $\lambda$ -abstractions which abstract the focus variables to produce a relation, the (Jackendoff's) presuppositional set or the background (in the sense of Krifka 2006) of the sentence.<sup>2</sup> And a function maps the meaning of the focus to the meaning of the scope either by focus movement of the variable at the interpretative level (Tancredi 1990; Drubig 1994; von Stechow 1991; Krifka 2006) or non-movement claim (Jackendoff 1972).<sup>3</sup>

While the SM approach considers that what contributes to different semantic values is the background or presupposition (à la Jackendoff) structure, Rooth's (1985) Alternative Semantics theory claims that focus affects the sentence's semantic truth conditions. In addition to the sentence's ordinary semantic value, focus identifies the alternative set properties  $C$  serving as a domain of quantification, and the variable as the focus semantic value of VP. The domain of quantification induced by *only* contains an alternative subset of the focus semantic value of the argument of *only* under consideration. Take (4a) for an example: Rooth shows that the domain of quantification is 'introducing  $y$  to Sue', and the focus evokes an alternative (nonsingleton) set and excludes other possible introductions but only selects the property of the form 'introducing Bill to Sue.' (For all properties of the type 'introduce  $x$  to Sue', where  $x$  is an alternative to Bill, if John has the property, then the property is 'introduce Bill to Sue'). Hence, in the context of (7a), (4a), with the interpretation of (6a), is false, but (4b), interpreted as in (6b), is true, since the only person John introduced Bill to is Sue. In contrast, the context of (7b) is possible for (4a), but not for (4b).

- (6) a. *The only person John introduced to Sue is Bill.*  
 b. *The only person John introduced Bill to is Sue.*

- (7) a. *John introduced Bill and Tom to Sue.*  
 b. *John introduced Bill to Sue and Mary.*

In short, in addition to the positive contribution of *only*, by claiming that the proposition in the scope of *only* is true (Horn 1969), the interpretation of *only* also has a negative contribution, which is described as “the statement that the elements of a set of alternative proposition that differ from the proposition in the scope of ‘only’ with respect to the focus value are false” (van Rooij and Schulz 2005). For the focus alternative view, the focus associate of *only*, largely assumed to be phonetically prominent, contributes to the activation of the alternative (contrast) set to be excluded when asserting the *only* sentences.

## 2.2. *Contrastive stress and the alternative set*

In spite of the dominant supposition that there exists a perfect correlation between focus and contrastive stress, this position is not without doubt. Kadmon (2001:375) states that “as a general rule, prosody alone does not disambiguate scope relations. . . As with any other kind of ambiguity, context plays a crucial rule in resolving scope ambiguities”, while prosody generally only gives partial information about the context (also mentioned by Rooth 1992: 109). Similar related views (Carlson 1984; Ward and Hirschberg 1985) have been voiced on account of the lack of a prosodic effects in disambiguating negation and most scope relations in Kadmon and Roberts (1986), and prosodic structures not being fully predictable from syntactic structure in Gussenhoven (1983). Moreover, even if adults may successfully utilize contrastive stress for disambiguation, first language acquisition studies done by Gennari et al. (2001), Gualmini et al. (2003), and Szendrői (2003) have shown that children were not as sensitive as adults with respect to their interpretation of the contrastive stress on the target focus as a clue to exclude members in the alternative (contrastive) set understood in the context.<sup>4</sup> Furthermore, Paterson et al.’s study (2003) showed that “young children predominantly made errors by failing to process contrast information.” The universality of contrastive stress in disambiguating *only* sentences is questioned by Gennari et al.’s (2001) study, which reported that while adults may have utilized contrastive stress in managing stress in ambiguous ditransitive contexts, children generally used the neutral stress pattern (contrasting VP alternatives). Gualmini et al. (2003), by replicating Halbert et al.’s (1995) study, showed that their 15 English-speaking children, unlike the adult control group, were largely unable to utilize prosodic information alone to

resolve ambiguities between IO or DOs in ditransitive (dative alternation) sentences, based on their value judgments elicited from acted-out puppet stories. The results led them to conclude that contrastive stress does not constitute a reliable cue in semantic disambiguation for English-speaking children as old as 5. Hence, prosodic information alone was not a sufficient source of information for children to interpret the DO associated with *only*, but discourse manipulation (with contextual clues) was needed.

The scenarios of the stories, as in (8), provided as the background contexts among the above experimental studies, basically had two recipients: one of whom received one object and the other of whom received two objects in the end. Therefore, a test utterance with a contrastively stressed IO, as in (9), is predicted to be false in the context of (8), since Piglet was not the only one who received a chair. In contrast, the utterance of (10) with the DO focus correctly reflects the ending of scenario (8); the chair was the only object that Tigger threw to Piglet.

- (8) a. *Tigger threw a chair over to Winnie the Pooh.*  
 b. *Tigger threw a table over to Winnie the Pooh.*  
 c. *Tigger threw a chair over to Piglet.*

(9) *Tigger only threw a chair to PIGLET.*

(10) *Tigger only threw a CHAIR to Piglet.*

In addition to tackling the issue of contrastive sensitivity, the above experiment design helps further probing into the consequent questions: what was contrasted or what was the activated alternative set when the participants failed the target trials. This is a problem that has been dealt with by Szendrői (2003) in defense of Reinhart's (1995, 2006) interface theory of focus, which will be treated subsequently.

2.2.1. *Focus set or focus domain?* While largely maintaining the focus alternative semantic view, Reinhart's (1995, 2006) interface theory of focus takes into consideration the interaction between contrastive focus and sentence main stress in weighing the cost of computation (focus interpretation) at the interface.<sup>5</sup> “[E]ach derivation is associated not with an actual focus, but with a set of possible foci, (p. 240)”; the definition of a focus set is repeated in (11).

(11) *Focus set*

The focus set of a derivation D includes all and only the constituents that contain the main stress of D.

(Reinhart 2006: 139)

Her formulation of the focus set is based on the theory of focus projection framed in terms of syntactic notions, making reference to the structural nuclear stress assignment by adopting Cinque's (1993) version of the nuclear stress (NS) rule: the most embedded element on the recursive side of the tree and hence the right-most or end nuclear stress in right-branching languages.<sup>6</sup> The F(ocus)-marking of an element that is in an NS assigned position, such as *boy* in (12a), facilitates the focus projection to higher maximal phrases that conform with the focus set in the derivation. Hence, the computation of the reference-set (e.g., [12b]) does not impose extra operations needed to interpret the unmarked focus. Therefore, the derivation of (12a) is economical (in consideration of the Economy Principle in Chomsky (1993) and "costless" in Reinhart's term. Consequently, the sentence with the "unmarked" focus can be used as an answer in any of the contexts in (13).

- (12) a. [IP *The mother* [VP *gave some milk to* [DP-IO *the BOY*]]].  
 b. *Focus set: {IP, VP, IO}*
- (13) a. *Whom did the mother give some milk to?*  
 b. *What did the mother do?*  
 c. *What happened?*

In contrast, when the focus is shifted to a position other than the NS assigned position, the F-marking of the focus cannot project; hence, it is only interpreted narrowly as a "contrastive" or "marked" focus. Thus, sentence (14a) can only satisfactorily answer (14b), instead of (13b and 13c). Reinhart (1995, 2006) claims that a derivation that requires a stress-shift operation is costly owing to a violation of the core principles of the computational system (CS), (i.e., the Nuclear Stress Rule (NSR) here), a violation of which is not allowed superfluously, but permitted just as a last resort to satisfy an interface requirement (Reinhart 2006: 243).

- (14) a. *The mother gave some MILK to the boy.*  
 b. *What did the mother give to the boy?*

Reinhart's view of focus projection differs from the standard theory of focus projection which appeals to the Argument Structure (AS), (e.g., Gussenhoven 1984 and Selkirk 1984, 1995). As Göbbel (2005) points out, Selkirk's theory of Focus Projection, repeated in (15) and (16), would allow F-marked (contrasted) but non-NS assigned DOs in dative constructions to project in the sense that the DO "integrates" with the verb into one "focus domain" (à la Gussenhoven's 1984 term), expressing a VP focus in (17) or a whole sentence focus in (18).

- (15) Basic Focus Rule  
An accented word is F-marked.  
(Selkirk 1995: 555)
- (16) Focus Projection (FP)
- a. F-marking of the *head* of a phrase licenses the F-marking of the phrase.
  - b. F-marking of an *internal argument* of a phrase licenses the F-marking of the phrase.  
(Selkirk 1995: 555)
- (17) *We knew that John wouldn't give up so easily.*  
*THAT's why we* [<sub>F</sub> sent a *LET*ter to John] (in order to convince...)  
(Göbbel 2005: 253)
- (18) a. *Why is John drunk?*  
b. [<sub>F</sub> *MAR*y ordered too many *BEERS* for him].  
(Göbbel 2005: 253)

However, as noted by Göbbel (2005), the AS approach to focus structure fails to account for the nonparallel status of the IO argument in the DOC and dative construction in the context of (19). While the focused IO in (19b) facilitates focus projection in the dative construction, the same IO in (19a) does not in the DOC.<sup>7</sup>

- (19) What did John do with the old bike?
- a. #John [<sub>F</sub> gave *MAR*y the old bike].
  - b. John [<sub>F</sub> gave the old bike to *MAR*y].  
(Göbbel 2005: 257)

While the focus projection theory may be too weak (for Göbbel 2005) or too strong (for Büring 2006),<sup>8</sup> intermediate phrasing is mediated through informational (non-)integration in determining the sentence stress, such as the “intermediate phrase” in Beckman (1996), “focus domain” in Gussenhoven (1984), the “(non-)autonomy” of the head (argument integration with the head) in a phrase in Jacobs (1999), or the “accent domain” in Büring (2006). In particular, Büring (2006) argues for a theory of default prominence that is independent of focus. According to him, an integrated accent domain, the argument integrating with the predicate, is ranked less prosodically prominent than a non-integrated accent domain (adjunct-modifyee). While Büring’s theory might account for the integration of the DO and the default prominence of the IO in the dative construction ([12a], [19b]), it is not clear whether and how the DO is integrated with the predicate in a DOC, the same problem with the traditional focus projection with respect to (19a) as raised by Göbbel.<sup>9</sup>



As for the focus interpretation in sentences with *only*, the issue of concern is if the default sentence prosody interacts with the (contrastively focused) focus associates. Büring's (2006) prominence-based theory may allow independence of the two, although it is not clear how it accounts for the DOC and dative construction. In contrast, in Reinhart's theory the interpretation of the focus associated with *only* is correlated with the focus projection discussed above. Computation is less costly (economical) in cases where the focus associate receives the NS, in the sense that the possible foci in the focus set are able to be interpreted. However, a narrow focus is rendered, a more costly derivation, when the focus associate does not receive the nuclear stress. Take sentences (9) and (10) as examples, repeated in (9'a) and (10'a), respectively, their focus-set consists of the respective focus argument and the VP, as shown in (9'b) and (10'b). The interpretations of a narrow focus, (9'c) and (10'c) respectively, and a VP wide focus, (9'd) and (10'd) respectively, are logically possible in regards to the context of (8). But (10'a), containing a marked focus, is costly because the stress-shift operation imposes an extra burden in the processing. Reinhart's consideration of economy in derivation may favor the unmarked and default focus readings, i.e., the neutral focus in (9'c) (contrasting with alternative receiver[s]) and the VP wide focus in (9'd) and (10'd) (contrasting with alternative events).

- (8) a. *Tigger threw a chair over to Winnie the Pooh.*  
 b. *Tigger threw a table over to Winnie the Pooh.*  
 c. *Tigger threw a chair over to Piglet.*
- (9') a. *Tigger only threw a chair to PIGLET.*  
 b. Focus set: {Piglet, threw a chair to Piglet}  
 c. nuclear stress (narrow focus): NO (predicted adult answer in context)  
 d. VP wide focus: NO
- (10') a. *Tigger only threw a CHAIR to Piglet.*  
 b. Focus set: {a chair; threw a chair to Piglet}  
 c. marked stress (narrow focus) : Yes (predicted adult answer in context)  
 d. VP wide focus: NO

To recapitulate, Reinhart's theory would predict that the VP focus and the focus associate with the NS are readily obtained and favored over the contrastive focus.

2.2.2. *Empirical studies.* Contrary to Reinhart's expectation, forty adult native speakers of English were shown to respond to contrastive

stress more successfully than responding to neutral focus in the eye-tracking recording experiment in Gennari et al.'s (2001) study. The adult subjects were more confused and tended to be slower in responding to the neutral stress conditions, e.g., (9'c). In the second experiment of their paper with eight target trials of the Truth Value Judgment task (adapted from Crain and Thornton 1998), twenty children correctly rejected the IO focus (9'c) of the target sentence (9'a), in 97.5% of the trials, but they also unexpectedly rejected sentences containing DO (the reading of 10'c) contrastive stress as in (10'a), in 63.5% of the trials, vs. the low rejection rate of 8% in the adult controls.<sup>10</sup> The reported reason that the children rejected (10) was because Tigger also threw a chair over to another participant in the story, (although it was true that Piglet only got a chair.) In summary, the children's results in Gennari et al.'s study are predicted by Reinhart's proposal, which hypothesizes that children interpret the more unmarked neutral stress, as in (9'a), more readily than the more marked contrastive stress, as in (10'a). The adults results, however, were not similarly predicted, since they tended to get confused in cases where the contrastive stress conflated with the neutral stress.

Similarly, in Gualmini et al.'s (2003) study, the researchers acted-out puppet scenarios after eight target trials and reported that their fifteen child participants successfully rejected the target sentence with IO focus (the [9'c] reading of [9'a]) 87% of the time,<sup>11</sup> while eight adult speakers (as a control group) always rejected it. The children's correct response rate to the DO focus (the reading of [10'c] of [10'a]) was, however, relatively low, 35% of the time. To see if the repetition of the context would facilitate the children's interpretations of DO contrastive stress, in their second experiment the target trial was preceded by a contrastive context, e.g., the bracketed part in (20). It was reported that children, being insensitive to contrastive stress, made use of the contrastive information in resolving contrastive (DO) stress and the correct response rate rose from 35% to 85%.

- (20) [*Tarzan threw a fish and a boat to the dolphin, but*] *he only threw a FISH to the penguin.*

Another similar experiment performed by Szendrői (2003) to test the truth value judgment of four target trials (two with IO stress, two with DO stress, and two fillers) of twenty-three Dutch children showed that children could fairly successfully reject an IO stress sentence, either interpreting it as the narrow focus (9'c) or the VP wide focus (9'd).<sup>12</sup> Some children consistently failed to accept a marked DO focus sentence (10'c), indicating that they resorted to a VP wide default focus reading (10'd).

Table 1. *The percentages of the children's correct responses to the target trials in three studies*

	Sentence Type	Indirect object focus (reject the target Ss)	Direct object focus (accept the target Ss)
Gennari et al. (2001)	Dative	97.5%	36.5% (vs. 92% of adults')
Gualmini et al. (2003)	Dative	87% (vs. 100% of adults')	35% (vs. 97% of adults') 86% (contrastive context effect)
Szendrői (2003)	Dative	84.8%	52.2%

The children's results in these three studies are summarized in Table 1, which seems to show a consistent pattern where English or Dutch children tended to judge IO focus (neutral stress) more successfully than judging the DO focus in the dative constructions. These results, plus Szendrői's reports of the children contrasting VP focus, lend partial support to Reinhart's interface theory of focus and the economy consideration in interpreting focus, even though the adults' results in Gennari et al. do not support Reinhart's proposal.

*2.2.3. Dative construction and double object construction.* Two issues are at stake here. First, the above studies base their discussions mainly on focus in the dative construction. The conclusion that children make use of default focus to resolve ambiguity cannot be fully verified without consideration of a comparable pattern for the double object construction (DOC). Consider the DOC sentences with the IO and DO focus in (21) and (22) respectively, corresponding to the dative construction sentences with the respective focus as in (9'a) and (10'a). The expected focus interpretations of these sentences under the context of (8) are summarized in Table 2. Reinhart's hypothesis would predict that the degree of difficulty in interpreting marked DO narrow focus in the dative construction (10'a) should be equivalent to the degree of difficulty in interpreting marked IO narrow focus in DOC in (21a). Consequently, the empirical question is whether speakers who wrongly accept marked DO focus in the dative construction (10'c) also wrongly accept IO focus in DOC (21c), and whether they can consistently and successfully interpret neutral IO focus in the dative construction (9'c) and neutral DO focus in DOC (22c). This issue has apparently not been seriously discussed previously.

- (21) a. *Tigger only threw PIGLET a chair.*  
 b. Focus set: {Piglet, threw Piglet a chair}

- c. marked stress (narrow focus): NO (predicted adult answer in context [8])
  - d. VP wide focus: NO
- (22) a. *Tigger only threw Piglet a CHAIR.*  
 b. Focus set: {a chair, threw Piglet a chair}  
 c. neutral stress (narrow focus) : Yes (predicted adult answer in context [8])  
 d. VP wide focus: NO

Table 2. *A summary of the expected responses of foci in the dative construction and DOC patterns in the context of (8)*

	Neutral stress & Expected response	Marked stress & Expected response	VP default reading Expected response
Dative	IO → No (9'c)	DO* → Yes (10'c) <sup>13</sup>	No (9'd) and (10'd)
DOC	DO → Yes (22c)	IO* → No (21c)	No (21d) and (22d)

The second issue is whether contrastive stress facilitates disambiguation in tonal languages, e.g., Chinese, in the same way it does in non-tonal languages, such as English and Dutch. This issue is discussed in the next section.

### 2.3. *Contrastive stress and Chinese zhi 'only'*

In Chinese, a tonal language, stress is not distinctively and lexically marked. Whether and (if yes) how word stress and sentence main stress would be required as a separate metrical representation is still under debate. Bao (2003) is dubious about the necessity of postulating a metrical representation for stress. By those who claim a phonological representation of stress at the word level (Chao 1968; Duanmu 2000; Lin 2001; Jin 1996, among others), no consensus has yet been reached as to the iambic or trochaic word stress assignment. The G(overnment)-NSR rule, a modified version of Zubizarreta's (1998) NSR proposed by Feng (2003), is the first claim that Chinese does require sentence neutral stress.

On the other hand, phonetic studies largely agree on stress effects in Chinese, such as a more expanded pitch range, and longer durations on syllables (e.g., Jin 1996; Liao 1996; Xu 1999) and stress effects on intonation contours (Gårding 1987; Shen 1990, among others).<sup>14</sup> Jin (p. 182) has further demonstrated that his sixteen subjects of a perception experiment were able to perceive different focus patterns, except for some diffi-

culty in judging the intransitive predicate focus and broad sentence focus. There seems to be no doubt that stress does contribute to acoustic and even perceptive effects inasmuch that when speakers utilize phonetic prominence, addressees are able to identify it (e.g., Pierrehumbert 1980; Cooper et al. 1985; Eady and Cooper 1986; and Chinese by Xu 1999, etc.). Instead of questioning the general consensus, the current study tackles the issue of whether contrastive stress facilitates *zhi* sentence disambiguation for Chinese adult speakers in a similar pattern as it does for speakers of non-tonal languages. Given a relevant context, do adult Chinese speakers utilize contrastive stress on either IO or DO arguments to single out the alternative set to resolve sentence ambiguity? We address this point immediately below.

2.3.1. *Chinese zhi: association with focus via contrastive stress?* While there has been volumes of studies related to the prosodic effects of focus, the issue of whether contrastive stress facilitates *zhi* sentence disambiguation in Chinese has not been seriously and empirically studied.<sup>15</sup> Unlike English *only* as a cross-category modifier, Chinese *zhi* only occurs preverbally as a predicate modifier, as can be seen in the contrast between (23a) and (23b).<sup>16</sup>

- (23) a. *Zhangsan zhi jieshao Wangwu gei Susan.*  
Zhangsan only introduce Wangwu to Susan  
'Zhangsan only introduced Wangwu to Susan.'
- b. *Zhangsan jieshao (\*zhi) Wangwu (\*zhi) gei Susan.*  
Zhangsan introduce only Wangwu only to Susan
- (24) a. *Zhangsan zhi jieshao [Wangwu]<sub>F</sub> gei Susan.*  
b. *Zhangsan zhi jieshao Wangwu gei [Susan]<sub>F</sub>.*
- (7') a. *John introduced Wangwu and Xiaoming to Susan.*  
b. *John introduced Wangwu to Susan and Mali.*

When some native speakers of Taiwanese Mandarin were given a context like (7') and asked (with stress on either the IO or the DO in [24]) if they would reject (24a) under the context of (7'a), but accept it under the context of (7'b), or likewise if they could accept (24b) under the context of (7'a), but reject it under the context of (7'b), they (both nonlinguists and linguists including phonologists) tended to be reluctant to use contrastive stress in this way.<sup>17</sup> It seems that they simply interpreted the exclusiveness of the two members, Wangwu and Susan, in the set in the introduction event. Consequently, stressing either the DO (24a) or the IO (24b) turns out to denote the same unique introduction event and no other introductions related to Wangwu and Susan are rendered.

Rather than resorting to stress, Chinese speakers utilize various syntactic structures for disambiguation, preferably followed by an overt (or contextually implied) negation conjunct.<sup>18</sup> The Chinese counterpart of (4a) may be paraphrased to (25), in which *ba* lit. take Wangwu occurs in a preverbal position.<sup>19</sup> The focus readily falls on Wangwu, the object immediately following *ba*,<sup>20</sup> and possibly a felicitous situation when Lisi introduced Wangwu to Susan and Mary. The second conjunct clarifies the contrast between these two DOs. And (26) with the dative phrase *gei Susan* ‘to Susan’ immediately following *zhi* is readily contrasted with the contextually understood participants, evidenced by the second negation conjunct.

- (4) a. *John only introduced [Bill]<sub>F</sub> to Sue.*  
 b. *John only introduced Bill to [Sue]<sub>F</sub>.*
- (25) *Lisi zhi ba [Wangwu]<sub>F</sub> jieshao gei Susan, (mei-you*  
*Lisi only BA Wangwu introduce to Susan, not-have*  
*ba [Bill] jieshao gei ta)*  
*BA Bill introduce to her*  
 (cf. [24a])
- (26) *Lisi zhi gei [Susan]<sub>F</sub> jieshao-le Wangwu, (mei-you*  
*Lisi only to Susan introduce-ASP Wangwu not-have*  
*gei [Mali] jieshao Wangwu)*  
*to Mali introduce Wangwu*  
 (cf. [24b])

However, the immediate constituent following *zhi* as the focus associate reading in (25) and (26) can always be overridden, depending on what is to be contrasted in the following conjunct, e.g., the IO in (25') and the DO in (26').<sup>21</sup>

- (25') *Lisi zhi ba Wangwu jieshao gei [Susan]<sub>F</sub>, mei-you ba Wangwu*  
*not-have BA Wangwu*  
*jieshao gei [Jane]*  
*introduce to Jane*  
 ‘... , he didn’t introduce Wangwu to [Jane].’
- (26') *Lisi zhi gei Susan jieshao-le [Wangwu]<sub>F</sub>, mei-you gei Susan*  
*not-have to Susan*  
*jieshao [Bill].*  
*introduce Bill*  
 ‘... , Lisi didn’t introduce Susan to Lisi.’

Moreover, the negation conjunct in (25)/(26) and (25')/(26') is used to clarify the focus without recourse even to contrastive stress. Even if emphasis might be used, it is not a necessary condition. Moreover, other

syntactic means like the DO preposing in (27) and pseudo-cleft in (28) also serve to render contrastive readings.<sup>22</sup>

- (27) *Zhi-you* [Honglouloumeng] *Zhangsan cai hui song*  
 only-have Red.Mansion.Dream Zhangsan then will give  
*gei Lisi.*  
 to Lisi  
 'Lit: Only the Red Mansion Dream (a novel), Zhangsan gave to Lisi.'
- (28) *Zhangsan song gei Lisi de zhi-you Honglouloumeng.*  
 Zhangsan give to Lisi DE only-have Red.Mansion.Dream  
 'What Zhangsan gave to Lisi is only Red Mansion Dream.'

2.3.2. *What is contrasted?* In a situation as in (29) in which Penguin gets a fish, and Dolphin gets a fish and a boat, the intended narrow IO focus or default VP focus would render (30) infelicitous under Reinhart's theory and the standard view, which assumes that all the elements in the alternative set (e.g., the participants, Penguin and Dolphin, the entities (the fish and the boat), and even the giving events (VPs) in the context of (29) are equally active. The IO is signaled out as the most prominent, as determined by accentuation. One logical question arises as to whether a DO focus reading of (30) is out of the question in the same context. Note that the sentences in (31) reflect the truth condition of (29) without focus manipulation. If DO focus of (30) is rendered, it may suggest that the hearer is either not sensitive to the contrastive stress or s/he interprets (30) into (31a) under the context of (29). This is basically the tendency of the results found in our experiments in Section 3, in contra with the standard view.<sup>23</sup> See Section 5.1 for further discussion.

- (29) a. *Tarzan threw a fish to Penguin.*  
 b. *Tarzan threw a fish to Dolphin.*  
 c. *Tarzan threw a boat to Dolphin.*
- (30) *Taishan zhi diu le yu gei [QIE]<sub>F</sub>.*<sup>24</sup>  
 Tarzan only throw ASP fish to Penguin  
 'Tarzan only threw a fish to PENGUIN.'
- (31) a. *Tarzan only threw a fish to Penguin.*  
 b. *Tarzan only threw a boat to Dolphin.*

2.3.3. *IO/DO asymmetry and semantic prominence of the DO.* The subsequent question is why the DO in (30) can be interpreted more prominently if accentuation is not factored in during computation. One might hypothesize that the association with a preferred focus is embedded in

Büring's (2006) theory of default prominence that is independent of (contrastive) focus. However, as mentioned in Section 2.2.1, it is not clear which argument in the triadic structures counts as a (prosodic) "adjunct" that is prosodically more prominent than an argument by default in his mechanism.<sup>25</sup> The ranking conditions of "adjacency" to the predicate (integration) and "final focus" that are employed by Büring (2000) to account for word order variations in German DOCs do not seem to avoid the problems of IO/DO asymmetry raised by Göbbel (2005) as discussed in 2.2.1.

Another alternative hypothesis is to conjecture a default prominence hierarchy that is not necessarily dependent on phonetic accentuation. Namely, given two arguments (in the triadic constructions) with equivalent information load in context, one argument is interpreted inherently more prominent than the other. This becomes evident for languages that do not primarily employ phonetic cue for disambiguation. Moreover, the competition for semantic prominence may be correlated with DO/IO asymmetries. The Theme role bears a basic relation with the verb in comparison with the Recipient role. It is ranked higher in the Thematic Hierarchy (TH), given the cross-linguistic fact that all languages allow (patient) DOs, but only some allow recipient or benefactive objects, as discussed in Dik (1997). In Chinese the Theme argument has a basic relation with the verb on account of its indispensability; see the contrast between (32b).

- (32) a. *Wo ji le yi-feng xin.*  
 I mail asp one-CL letter  
 'I mailed a letter.'
- b. *\*?Wo ji le Zhangsan.*  
 I mail asp Zhangsan  
 'I mailed Zhangsan.'

English DOs can be passivized in dative constructions, but not in DOCs, (33c) vs. (34c), and IOs can be passivized in DOCs, but not in dative constructions. However, Chinese allows only DO to be passivized (36a) vs. (36b), relativized (37a) vs. (37b) or as the head noun in a pseudo-cleft construction (38) in either of the constructions.

- (33) a. *John gave that book to Bill.* — Dative  
 b. *\*Bill was given that book to.* — \*IO passivized  
 c. *The book was given to Bill by John.* — DO passivized
- (34) a. *John gave Bill that book.* — DOC  
 b. *Bill was given that book by John.* — IO passivized  
 c. *\*The book was given Bill by John.* — \*DO passivized



- (35) a. *Wo ji gei ta shu.* — DOC  
 I mail to him book.  
 'I mailed to him a book.'
- b. *Wo ji shu gei ta le.* — Dative  
 I mail book to him asp  
 'I mailed a book to him.'
- (36) NP-movement
- a. *Shu bei wo song gei ta le.* — DO passivized  
 book by me give to he asp
- b. *\*Wo bei ta song gei shu le.* — \*IO passivized  
 I by him give to book asp  
 (Li 1990: 85, #3)
- (37) *Wh*-movement (relativization)
- a. *Zhei jiushi [[wo song (gei) tamen] de shu].* — DO passivized  
 this is I send to them de book  
 'This is the book that I sent (to) them.'
- b. *\*Zhe jiushi [[wo song shu] de nage ren].* — \*IO passivized  
 this is I send book DE that man  
 (Li 1990: 85, #4)
- (38) Pseudo-cleft
- a. *[[wo song (gei) tamen] de Ø] shi Hongloumeng].*  
 I send to them de be Red.Mansion.Dream  
 — DO passivized  
 'What I gave to them is Red Mansion Dream.'
- b. *?\*[[wo song gei (ta) Hongloumeng] de nage ren] shi  
 Zhangsan].*  
 I give to (him) Red.Mansion.Dream DE that man BE  
 Zhangsan  
 'The person that I gave Red Mansion Dream to is Zhangsan.'

More support for the relative prominence relation between these two arguments can be drawn from the TH with regards to the "animacy" relation, animate arguments outrank inanimate ones (Givón 1984 among others). The TH is motivated so as to represent "a scale of discourse topicality of argument types" (Bresnan and Kanerva 1989: 23–24). Animate participants tend to be more "topic-worthy in discourse" in consideration of the degree of mental engagement of participants, in Givón (2001 Vol. 1: 200).<sup>26</sup> Hence, the Recipient argument tends to be more "topical" than the Theme argument (Givón 1984, 2001: 269).<sup>27</sup> If we understand this notion of "topicworthiness" in terms of information structure, it then

follows that the postverbal *in situ* Theme argument is readily new or in focus. In contrast, when it is construed in a discourse context, it tends to undergo topicalization to the left peripheral position, as illustrated in (39a), rather than staying in a postverbal position, as in (39b), (39c). This line of thinking is supported by prevalent definite object topicalization in Chinese as in (36)–(38), cf. German object scrambling for defocusing discussed in Drubig (2003).<sup>28</sup>

- (39) a. *Na-ben shu wo ji gei Zhangsan le.*  
 That-CL book I mail to Zhangsan part  
 ‘Lit. That book, I have mailed to Zhangsan.’
- b. *Wo ji yi-ben/?na-ben shu gei Zhangsan le.*  
 I mail one-CL/that-CL book to Zhangsan part
- c. *Wo ji gei Zhangsan yi-ben/?na-ben shu le.*  
 I mail to Zhangsan one-CL/that-CL book part

The above discussion leads us to ask the following questions. First, are adult Chinese speakers sensitive to contrastive stress in resolving ambiguity in association with focus cases? Do they follow the same prosodic focus pattern as English native speakers do, in terms of being aware of marked contrastive stress, or resorting to neutral stress or VP focus interpretations as predicted by Reinhart? If the phonetic stress is not the primary cue for disambiguation, how then is focus associate ambiguity interpreted? Can it be the case that there exists a preferred focus associate associating with *zhi* in the triadic constructions?

### 3. Experiment 1

With the aim of tackling the above-mentioned questions, the first experiment adapted the story schema and the *Value Judgment Task* (Crain and Thornton 1998) conducted by Gennari et al. (2001), Gualmini et al. (2003), and Szendrői (2003).

#### 3.1. Subjects

One hundred undergraduate students of who are Taiwanese Mandarin native speakers participated in the first experiment: forty-two students from the Chinese department and fifty-eight students from the English department at National Sun Yat-sen University in Taiwan. The subjects were tested separately in three respective classes: Introduction to Linguis-

tics for Chinese major freshmen, Freshman English for English major freshmen, and Introduction to Linguistics for English-major sophomores.

### 3.2. *Methods*

3.2.1. *Materials and design.* In Gualmini et al.'s (2003) Value Judgment Task designed for testing children, puppets were used to act out the context stories, and at the end of each story a different puppet spoke the test sentence. If the puppet spoke correctly, the child subjects were asked to give him a reward. Since it was adults who were tested, sixteen stories were shown on a projector through a PowerPoint computer file containing a set of pictures for each story accompanied by recorded narrations. After each story was displayed on the projected screen and its narration played, the screen would become blank for one second and then only the test sentence was played after a chime. The subjects had five seconds to tick the True or False answer in their questionnaires. All the voice files were recorded and played with Gold Wave software in advance to maintain consistent sound quality and played using the same.

#### *Test sentences*

The tested sentences consisted of two sentence types: dative construction (DATIVE), from sentences (S1) through (S8), and double object construction (DOC), from sentences (S9) through (S16). The verbs used included: *song* 'send' (4), *mai* 'sell' (3), *diu* 'throw' (2), *jie* 'lend' (2), *di* 'pass' (1), *mai* 'buy' (1), *na* 'take' (1), *dai* 'bring' (1), and *gei* 'give' (1). The bracketed number indicates the frequency of use. The eight sentences of each construction were divided into two pairs respectively: one set with a summary sentence immediately preceding the test statement and the other set without it. For each set of four sentences, the contrastive stress fell on the IO (with one expected true and one expected false answer), and on the DO (with one expected true and one false answer). Table 3 (for Dative) and Table 4 (for DOC) summarize each story ending respectively (R[ow]-2), English translations of the Chinese sentences (R-3), expected answers (R-4), test sentences preceded by a summary sentence (R-5) and their respective expected responses (R-6). The sentence structures and intended stress in R-5 are parallel with those in R-3, but with a difference in a preceding summary statement. The Chinese test sentences are repeated below. The same pattern applies to Table 4 with DOC sentences. See sample prosodic demonstrations in Appendix 2.<sup>29</sup>

- (S-1) *Laoshi zhi song shu gei A-QIANG.*  
 Teacher only give book to John  
 'The teacher only gave a book to JOHN.'

Table 3. *The dative construction (DATIVE) sentences*

	Stress on IO	Stress on IO	Stress on DO	Stress on DO
Row-2 Story ending	<i>The teacher gave Flora a pen, John a book and a pen.</i>	<i>Snow White bought a cake, and Pooh Bear a cake and a cookie.</i>	<i>Piglet brought bread to Snow White, and bread and butter to Goofy.</i>	<i>Mickey bought a candy, and Minnie bought a candy and a cookie.</i>
R-3: Tested sentence without the summary clue	(S-1) The teacher only gave a book to JOHN. <sup>30</sup>	(S-2) Barney only sold a cake to SNOW WHITE.	(S-3) Piglet only gave BREAD to Snow White.	(S-4) Goofy only sold a COOKIE to Minnie.
R-4: Expected response	True	False	True	False
R-5: Tested (underlined) sentence with a preceding summary clue	(S-5) Dolphin had a fish and a boat, Penguin had a fish, but <u>Tarzan only threw a boat to DOLPHIN.</u>	(S-6) Winnie the Pooh sent a book and a card to Tigger, but <u>he only sent a card to PIGLET.</u>	(S-7) Goofy had a basketball and a jumping rope, but <u>Cinderella only lent a BASKETBALL to Minnie.</u> <sup>31</sup>	(S-8) Therefore, Mickey got Harry Potter's cell phone message and e- mail, and Little Mermaid got an email. <u>Harry Potter only sent a MESSAGE to Mickey.</u>
R-6: Expected response	True	False	True	False

(S-2) *Bangni zhi mai dangao gei BAI-XUE.*  
Bunny only sell cake to Snow-White  
'Bunny only sold cake to SNOW WHITE.'

(S-3) *Xiaozhu zhi na MIANBAO gei Bai-xue.*  
Piglet only take bread to Snow-White  
'Piglet only took BREAD to Snow White.'

(S-4) *Gaofei zhi mai BINGGAN gei Mini.*  
Goofy only sell cookie to Minnie  
'Goofy only sold a COOKIE to Minnie.'

(S-5) *Taishan zhi diu le xiao-chuan gei HAITUN.*  
Tarzan only throw asp small-boat to Dolphin  
'Tarzan only threw a boat to DOLPHIN.'

Table 4. The double object construction sentences (DOC)

	Stress on IO	Stress on IO	Stress on DO	Stress on DO
Row-2 Story ending	<i>Snow White had a rose, and Minnie had a rose and a bird.</i>	<i>Michael threw Jimmy a Frisbee, and Danny a Frisbee and a doll.</i>	<i>Minnie brought Goofy a flower, and Mickey a flower and a cake.</i>	<i>Donald passed Tigger a piece of paper, and Snow White a piece of paper and a pencil.</i>
R-3: Tested sentence without the summary clue	(S-9) Donald Duck only sent MINNIE a bird.	(S-10) Michael only threw JIMMY a Frisbee.	(S-11) Minnie only brought Goofy a FLOWER.	(S-12) Donald Duck only passed Snow White a PENCIL.
R-4: Expected response	True	False	True	False
R-5: Tested (underlined) sentence with a preceding summary clue	(S-13) Now Winnie the Pooh has a car, and Piglet has a car and a house. <u>But the genie only gave PIGLET a house.</u>	(S-14) Mickey has a hamburger and a glass of milk, <u>but the owner only sold GOOFY a hamburger.</u>	(S-15) Mickey has a bag and a camera, but <u>Donald Duck only lent Snow White a BAG.</u>	(S-16) Finally Winnie the Pooh has an alarm clock, and Minnie gets a watch and an alarm clock. <u>But Goofy only bought Minnie a WATCH.</u>
R-6: Expected response	True	False	True	False

(S-6) *Weini zhi ji kapian gei XIAOZHU.*  
Winnie.the.Pooh only mail card to Piglet  
'Winnie the Pooh only mailed a card to PIGLET.'

(S-7) *Huiguniang zhi jie LANQIU gei Mini.*  
Cinderella only lend basketball to Minnie  
'Cinderella only lent a BASKETBALL to Minnie.'

(S-8) *Hali Pote zhi ji JIANXUN gei Miqi.*  
Harry Potter only mail message to Mickey  
'Harry Potter only mailed a MESSAGE to Mickey.'

(S-9) *Tanglaoya zhi song gei MINI xiaoniao.*  
Donald.Duck only send to Minnie bird  
'Donald Duck only sent MINNIE.'

- (S-10) *Zhuren zhi diu gei JIMI feipan.*  
Owner only throw to Jimmy frisbee  
'The Owner only threw JIMMY a frisbee.'
- (S-11) *Mini zhi dai gei Gaofei HONGHUA.*  
Minnie only bring to Goofy read.flower  
'Minnie only brought Goofy a RED FLOWER.'
- (S-12) *Tanglaoya zhi di gei Bai-Xue QIANBI.*  
Donald.Duck only pass to Snow-White pencil  
'Donald Duck only passed Snow White a PENCIL.'
- (S-13) *Jingling zhi song gei XIAOZHU fangzi.*  
Genie only give to Piglet house  
'Genie only gave PIGLET a house.'
- (S-14) *Laoban zhi mai gei GAOFEI hanbao.*  
owner only sell to Goofy hamburger  
'The owner only sold GOOFY a hamburger.'
- (S-15) *Tanglaoya zhi jie gei Bai-xue BEIBAO.*  
Donald.Duck only lend to Snow-White bag  
'Donald Duck only lent Snow White a BAG.'
- (S-16) *Gaofei zhi mai gei Mini SHOUBIAO.*  
Goofy only buy to Minnie watch  
'Goofy only bought Minnie a WATCH.'

### Stories

The stories were structured in such a way that three characters were involved in each story, including a giver and two recipients. At the end of each story, recipient A received only one object and B received two objects, one of which was given to both recipients; see Table 5. The length of each story was limited to one hundred Chinese characters. Table 6 summarizes the expected focus readings, their corresponding contexts, and their respective test sentences.

To illustrate, the English translation of the first story is found below. There are generally three to five slide pictures for each story.

Table 5. *The structure of the stories*

Recipient A	Recipient B
Object 1	Object 1
∅	Object 2

Table 6. *The schema of the stories*

Type	True/False	Context	Test sentence
1	True for IO focus	Recipient B (stressed) received object 2	1, 5, 9, 13
2	False for IO focus	Recipient A (stressed) received object 1	2, 6, 10, 14
3	True for DO focus	Recipient A received object 1 (stressed)	3, 7, 11, 15
4	False for DO focus	Recipient B received object 2 (stressed)	4, 8, 12, 16

(Story 1) A teacher wants to give presents to her two students, John and Flora, for their good performances during the semester. The tutor gives a pen to Flora, and a book to John. John, however, thinks Flora's pen is better, so he asks the tutor if he can get a pen, too. Though the tutor has a pen in her bag, she cannot give it to John. If she does so, she would have no pen left for herself. So John is disappointed. Then the tutor finds another pen in the drawer, so she gives the pen and the book to John.

At the end of the story, Flora (recipient A) received a pen and John (recipient B) received a pen and a book. And the sentence (S-1) *The Teacher only gave a book to John* with IO focus is expected to be true, since he was the only person who received a book.

The second story pattern was intended to provide a false answer of IO focus, the context of which occurred when recipient A (stressed) received object 1, corresponding to our test sentences 2, 6, 10, and 14. Take (S-6) *He only sent a card to PIGLET* as an example; Winnie the Pooh sent a card to Piglet (recipient A), and a book and a card to Tigger (recipient B). Sentence (S-6) is expected to be false, because Piglet (recipient A) was not the only one who got a card (object 1). Likewise, an expected true context with DO focus in (S-3) *Piglet only gave the BREAD to Snow White* (plus stories 7, 11, and 15) in the third type is obtained when it was only the bread (object 1) that Piglet gave to Snow White (recipient A), despite the fact that Piglet brought the bread and butter to Goofy. In contrast, the false context for DO focus (e.g., stories 4, 8, 12, and 16) occurred when recipient B received object 2 (stressed). For example, in the fourth story, Mickey finally bought a candy, and Minnie bought a candy and a cookie, and (S-4) *Goofy only sold a COOKIE to Minnie* was incorrect because a cookie was not the only thing that Goofy sold to Minnie.

### *Recording*

The stories and test sentences were recorded by two female voices (one for the stories and one for the test sentences) in an acoustically shielded room, and were digitalized with a DaT-recorder at 16bit/44, 1kKz sampling rate with Gold Wave software version 5.12.<sup>32</sup>

*Procedure and judgments*

PowerPoint files were used to present the randomized stories with pictures and Gold Wave sound files embedded in the slides which played automatically. After the speaker finished narrating each story, and before the test sentence was played, there was a one-second pause with a blank page on the screen followed by a ringing sound to signal the forthcoming sentence to be judged. The subjects were asked to judge the true/false values of the sentences based on the ending of each story: an “O” for the correct values and an “X” for the incorrect ones. There was only a five second interval of time for the subjects to respond. The whole procedure including filling out the background information took about 25 minutes. Two groups of the subjects were tested with the stimuli in a different order from those used in the other group.

*Scoring*

“1” was coded for correct responses, and “0” for wrong ones. The scores were recorded in an SPSS (Windows version 11.5) Data Editor file under one variable of major specification (e.g., “1” for Chinese majors and “2” for English majors), and sixteen variables for each sentence type.

3.2.2. *Comparisons with previous designs**Materials, design and participants*

The PowerPoint story picture file embedded with sound-recorded narrations enabled us to test a larger (100 adults) group to minimize a statistical bias, however this method could hardly be applied to child subjects.

*Test sentences*

As mentioned in Section 2.3.4, only the dative construction sentence type was discussed by Reinhart and tested in those studies (Gennari et al. 2001; Gualmini et al. 2003; and Szendrői 2003). In Gualmini et al.’s (2003) study, there were four test sentences with stress either on DO or IO focus in their first experiment, and only DO focus sentences were tested, preceded by a contextual clue in their second experiment. In contrast, this study employed both sentence types, the dative construction and DOC, and intended true and false judgments equally for either object focus (2 [Dative/DOC] \* 2 [IO/DO foci] \* 2 [T/F answers] = 8), and an additional set of the tested sentences preceded by a summary of the context,  $8 * 2 = 16$  sentences in total. The purpose of testing both the dative construction and DOC was to investigate whether sentence nuclear (neutral) stress would interact with the DO/IO focus in either neutral or marked (contrastive) stress positions.



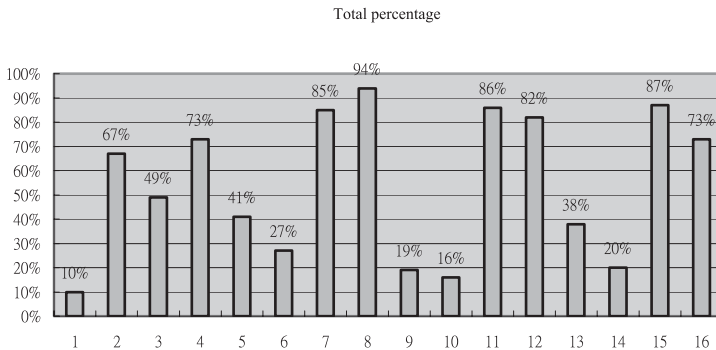


Figure 1. All the subjects' accurate responses to all 16 sentences (in %)

### 3.3. Results

3.3.1. *Sentence judgments.* The correct responses of all the 100 subjects are tabulated in Figure 1. Among the DOCs (sentences [S-9] ~ [S-16]), there appeared a uniform tendency: DO focus ([S-11], [S-12], [S-15], [S-16]) being judged better than IO focus ([S-9], [S-10], [S-13], [S-14]) ( $t = -19.770$  at the significance level  $p < .000$  of the paired sample t-test result). This observation, however, cannot be a conclusive argument for Cinque's NSR theory or the general view that considers the sentence final element stressed, because the correct responses of DO focus in the dative construction sentences (S-4), (S-7) and (S-8) were higher than the correct IO responses in (S-1), (S-5), (S-6). Overall, in the dative construction, the DO foci were judged more successfully than the IO foci ( $t = -11.772$  and  $p < .000$ ), except (S-2).<sup>33</sup> In short, the results show the tendency of interpreting DO foci more prominently than IO foci in both the dative construction and DOC types, while there are more variations in the dative construction type than in DOC type, the explanation of which will be discussed in Section 5.

3.3.2. *Statements without vs. with a story summary.* In Gualmini et al.'s (2003) second experiment of children's responses to DO focus preceded by a contrastive summary conjunct, it was found that the sentences were judged more correctly (51/59 tokens, 86%), compared with those without the contextual information (35%) in their first experiment; (see Table 1). The context factor was taken into consideration in our study: see the pairs of the dative construction sentences which were each

preceded by a summary clue in (S-5)–(S-8) (the bracketed part in [S-5] below) vs. the dative construction (S1)–(S-4) without clues, and DOC (S-13)–(S-16) vs. DOC (S-9)–(S-12) in Tables 3 and 4.

(S-5) a. Story summary:

Jieguo      Haituan    you    yitiao    yu    han    yitiao  
 In.the.end    Dolphin    has    a CL    fish    and    a CL  
 xiaochuan,    Qie        you    yitiao    yu.  
 small.boat    Penguin    has    a CL    fish

b. Tested sentence:

Danshi Taishan zhi diu xiaochuan gei HAITUN.  
 But Tarzan only throw small.boat to Dolphin.  
 ‘But Tarzan only threw a small boat to DOLPHIN.’

The paired sample test in Table 7 illustrates mixed results. First, six out of eight pairs (pairs 1, 3, 4, 5, 6, 7) show a positive effect of contextual information, and the first three pairs show significant differences. These results indeed conform to those in Gualmini et al.’s study.

As for the two pairs (2, 6) that show a counter-expected result: sentences preceded by a context summary were not judged better, the problem with pair 6 can be dismissed, since there is no significant difference and it may be due to participants’ successful judgment on DO focus in most DOC sentences. Hence the only problem that is left is with respect to pair 2 and specifically to the high correction rate of IO focus of (S-2), a problem that is unknown to me as mentioned in Note 34. Overall we still see a tendency of positive effects of story summaries; however, for the ease of discussion, the following discussion will combine the same sentence types without further differentiating the context factor.

Table 7. *The paired sample test of the sentences provided with vs. without a summary clue*

		Mean	t	Sig. (2-tailed)
Pair 1	DATIVE1-DATIVE5	-.31	-5.690	.000**
Pair 2	DATIVE2-DATIVE6	.40	6.456	.000**
Pair 3	DATIVE3-DATIVE7	-.36	-5.733	.000**
Pair 4	DATIVE4-DATIVE8	-.21	-4.214	.000**
Pair 5	DOC9 - DOC13	-.19	-3.487	.001**
Pair 6	DOC10 - DOC14	-.04	-.815	.417
Pair 7	DOC11 - DOC15	-.01	-.241	.810
Pair 8	DOC12 - DOC16	.09	1.630	.106

\*\*  $P < .01$

3.3.3. *Double Object Construction (DOC)*. To investigate whether the IO and DO foci were consistently correlated, the results of the Pearson Correlation test among the eight sentence types are shown in Table 8. Let us first focus on the correlations among the four DOC sentence types (the dark grey area): IO focus with a true value (DOC 9 and 13) and with a false value (DOC 10 and 14), DO focus with a true value (DOC 11 and 15), and with a false value (DOC 12 and 16). There was a significant positive correlation ( $p < .01$ ) between DOC –9 and 13 and DOC 10 and 14 ( $r = .327$ ) judgments in IO focus sentences. As shown in Figure 1, the correct rate of judging IO focus was low, and the above positive correlation suggested that subjects who wrongly judged the sentences with a true value (in DOC 9) and 13) tended to wrongly judge the sentences with a false value (in DOC 10 and 14). In other words, the subjects had difficulties in disambiguating a contrastive IO focus no matter if the expected answer was true or false. In contrast, there were significant negative correlations ( $p < .01$ ) in the two pairs of DOC 9 and 13/DOC 12 and 16 ( $r = -.515$ ), and DOC 10 and 14/DOC 12 and 16 ( $r = -.429$ ), indicating that subjects who wrongly judged the IO focus (DOC 9 and 13 or DOC 10 and 14) tended to judge DO focus (DOC 12 and 16) correctly. These correlated pairs lend further support to the above-mentioned point that the DO focus is interpreted more prominently than the IO focus in DOCs.

3.3.4. *Dative sentences*. Likewise, four pairs of the dative construction sentences were compared: IO focus with a true value (DATIVE [S-1] and [S-5], and with a false value (DATIVE [S-2] and [S-6]), DO focus with a true value (DATIVE [S-3] and [S-7]), and with a false value (DATIVE [S-4] and [S-8]). The Pearson Correlation test in Table 8 (the light grey area) shows a significant correlation ( $p < .01$ ,  $r = .342$ ) between DATIVE 1 and 5 and DATIVE 2 and 6, and a significant negative correlation between DATIVE 2 and 6 and DATIVE 3 and 7 ( $p < .01$ ,  $r = -.318$ ). Similar to the DOC results, subjects who correctly responded to DO focus tended to fail to judge IO focus correctly in the dative construction sentences, whereas people who judged the IO focus (S-1) and (S-5) wrongly tended to judge another pair of IO focus (S-2) and (S-6) wrongly as well.

3.3.5. *DATIVE and DOC sentences*. When collapsing the two sentence types, very consistent correlations (13 out of 16 pairs with 6 positive correlations and 7 negative correlations) could also be seen. There were significant positive correlations of IO foci, and positive DO foci correlations between DOC and the dative construction sentences.<sup>34</sup> These results here echo the earlier ones in that regardless of the sentence types the

Table 8. *Pearson Correlation test among responses to DO and IO foci in the Dative Construction (DATIVE) and Double Object Construction (DOC)*

	DATIVE 1 and 5	DATIVE 2 and 6	DATIVE 3 and 7	DATIVE 4 and 8	DOC 9 and 13	DOC 10 and 14	DOC 11 and 15	DOC 12 and 16
DATIVE 1 and 5								
DATIVE 2 and 6	<b>.342(**)</b>							
DATIVE 3 and 7	-.118	<b>-.318(**)</b>						
DATIVE 4 and 8	-.102	-.173	.040					
DOC 9 and 13	<b>.541(**)</b>	<b>.306(**)</b>	<b>-.247(*)</b>	<b>-.371(**)</b>				
DOC 10 and 14	.157	<b>.479(**)</b>	<b>-.426(**)</b>	<b>-.335(**)</b>	<b>.327(**)</b>			
DOC 11 and 15	.023	<b>-.234(*)</b>	.127	.219(*)	.089	-.040		
DOC 12 and 16	<b>-.398(**)</b>	<b>-.326(**)</b>	<b>.381(**)</b>	<b>.256(*)</b>	<b>-.515(**)</b>	<b>-.429(**)</b>	.025	

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

(N in each cell = 100)

participants were quite consistent when making judgments on either IO focus or DO focus. When one did better on DO foci in one sentence type, s/he tended to respond correctly in another sentence type; likewise, if one did poorly on IO focus in one type, s/he tended to answer incorrectly in another sentence type.

This consistency is further shown from the significant negative correlations between the IO focus and the DO focus in both sentence types (7/8 pairs). Subjects who judged the IO focus poorly in the dative construction type conversely tended to perform well in judging DO focus in the DOC type.<sup>35</sup> Those who succeeded in judging the DO focus in the dative construction type tended to fail to judge the IO focus in the DOC type.<sup>36</sup> In short, regardless of the sentence types, subjects who performed well in judging DO focus tended to fail to judge IO focus and vice versa. The overall results showed a consistent tendency, which was that the subjects did fairly well in judging DO focus, but poorly in judging IO focus in both constructions.

Recall our discussion of Reinhart's focus set approach in Section 2.2.3 in that the contrastive narrow focus reading is expected to be more difficult. Her theory would predict that the degree of difficulty in the marked DO focus in the dative construction should be correlated with that in the marked IO focus in the DOCs; see Table 2. Namely, her theory would have predicted correlations between the IO focus in the dative construction and the DO focus in the DOC, and correlations between the DO focus in the dative construction and the IO focus in the DOC. However, our results in Table 8 do not seem to reflect this pattern of correlation.

#### 4. Experiment 2

In order to further test what was contrastively interpreted when the participants were making their judgments, multiple choice questionnaires were given to another fifty-one native Chinese adult speakers (mostly sophomore English majors at National Sun Yat-sen University). The interval time span was lengthened from five seconds in the first experiment to fifteen seconds in the second one, and a summary picture of each story was added to accompany the uttered test sentence. All the sixteen stories and settings were the same as those in the previous experiment. From among four choices: DO focus, IO focus, VP focus and 'not sure' of each question, they were asked to pick the one that best reflected the test sentence, as illustrated in (40) in response to (S-5) in the context of (29'). Choice (b) was the expected IO focus answer, while choice (a) indicated the VP focus interpretation, and choice (c) the DO focus reading. Instead of just answering yes or no, the (randomized) choices on the one hand explicitly explained the reasons for the participants' choices, and on the other hand were instrumental for verifying if the VP default focus reading is indeed an unmarked choice. All the choices of the sixteen contexts were categorized and summed up in Figure 2.

- (S-5) *Tarzan only threw a boat to DOLPHIN.*  
 (29') a. *Tarzan threw a fish to Penguin.*  
       b. *Tarzan threw a fish and a boat to Dolphin.*
- (40) a. *No, because Tarzan also threw a fish to Penguin.* (VP)  
       b. *Yes, because only Dolphin got a boat.* (√IO)  
       c. *No, because Tarzan also threw Dolphin a fish.* (DO)  
       d. *Not sure*

As shown in Figure 2, except for (S-2), the results give an even stronger indication of the DO focus interpretation across the board than

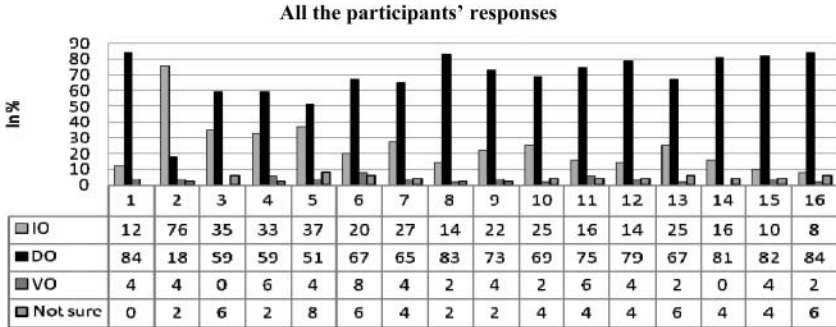


Figure 2. All the participants' responses to all 16 sentences (in %)

Experiment 1 does. Moreover, the VP focus reading in all cases was quite low, no more than 6%. A detailed comparison between these two experiments is summarized in Table 9, and the discussion follows in turn.

## 5. Discussion

The results of the study suggest that even though the phonological prominence was noticed by the subjects, it did not surface as a determining factor to disambiguate sentences. When the subjects heard the stressed phrases, they laughed and some even asked in their questionnaires whether we could just utter them without the emphasis.<sup>37</sup> Their feedback was expected, since stress is not lexically distinctive in Chinese and native speakers (at least of Taiwanese Mandarin) tend not to disambiguate sentences primarily with stress. The “unnatural” stressed phrases are justifiable in this study, since it was designed so as to arouse awareness of the emphasis. Even though they noticed it, their responses did not seem to be affected by the stress. If they were sensitive to stress for disambiguation, their correct responses of IO focus (in Ss-1, 2, 5, 6, 9, 10, 13 and 14) and DO focus (Ss-3, 4, 7, 8, 11, 12, 15 and 16) should have been equally high. But the results of our Chinese-speaking participants' responses were quite different from those of the English-speaking adults, who performed equally well in detecting either IO and DO foci in Gualmini et al.'s study.

Table 9 summarizes the schema of the stories as in Table 6 (column 3 here), the information presented in Tables 2 and 3 (columns 1 and 4 here), responses expected by Reinhart's theory (column 5), and the results from current two experiments (columns 6 and 7). The sentence patterns in Table 9 correspond to those in Tables 3 and 4: Types 1-1 and 1-2 corre-

Table 9. A summary of the contexts, tested sentences, expected responses and the Chinese speakers' accurate responses (in %)

Judgment	Type	Context	Tested sentences	Judgments predicted by Reinhart's theory	Exp. 1: T/F answers	Exp. 2: Multiple choice
<b>IO focus</b> True	1-1	Recipient B (stressed) received	<b>Dative:</b> (Ss 1,5) bring <u>object 2</u> to <b>B*</b>	neutral focus: Yes	Yes: <b>26%</b> No: 74%	<b>IO: 25%**</b> DO: 68% VP: 4%
	1-2	object 2	<b>DOC:</b> (Ss 9, 13) bring <u>B</u> object 2	narrow focus: Yes	Yes: <b>29%</b> No: 71%	<b>IO: 24%</b> DO: 70% VP: 3%
<b>IO focus</b> False	2-1	recipient A (stressed) received	<b>Dative:</b> (Ss 2,6) bring object 1 to <u>A</u>	neutral focus: No	No: <b>47%</b> Yes: 53%	<b>IO: 48%</b> DO: 42% VP: 6%
	2-2	object 1	<b>DOC:</b> (Ss 10, 14) bring <u>A</u> object 1	narrow focus: No	No: <b>18%</b> Yes: 82%	<b>IO: 21%</b> DO: 75% VP: 1%
<b>DO focus</b> True	3-1	recipient A received object 1	<b>Dative:</b> (Ss 3, 7) bring <u>object 1</u> to A	narrow focus: Yes	Yes: <b>67%</b> No: 33%	<b>DO: 62%</b> IO: 31% VP: 2%
	3-2	(stressed)	<b>DOC:</b> (Ss 11, 15) bring A <u>object 1</u>	neutral focus: Yes	Yes: <b>87%</b> No: 13%	<b>DO: 78%</b> IO: 13% VP: 5%
<b>DO focus</b> False	4-1	recipient B received object 2	<b>Dative:</b> (Ss 4, 8) bring <u>object 2</u> to B	narrow focus: No	No: <b>84%</b> Yes: 16%	<b>DO: 72%</b> IO: 24% VP: 4%
	4-2	(stressed)	<b>DOC:</b> (Ss 12, 16) bring B <u>object 2</u>	neutral focus: No	No: <b>78%</b> Yes: 22%	<b>DO: 81%</b> IO: 11% VP: 3%

\* The underlined part indicates the focus.

\*\* The boldface numbers indicate the percentages of the expected responses.

sponding to those in the first column, Types 2-1 and 2-2 equivalent to the second column, Types 3-1 and 3-2 the third column, and Types 4-1 and 4-2 the fourth column in Tables 3 and 4 respectively. As mentioned in Section 2.2.3, only the dative construction was tested in previous relevant studies, and the high correct rates of the children's interpretation of IO focus were because of the convergence of the IO focus and the default sentence main/neutral stress, as claimed by Reinhart (1995, 2006) and Szendrői (2003), who also predicted that the VP default scope would have the upper hand in competing with the more marked DO contrast focus in the dative construction. Their sentence structures correspond to

Types 1-1 and 2-1 in Table 9, the same as the types in the first and second columns in Table 3. Contrary to Reinhart's predictions, her expected neutral IO focus (boldfaced responses in the last two columns in Table 9) was not rendered prominently in both experiments in this study. Even though the IO marked narrow focus in the DOC type was judged relatively poorly, as shown in Types 1-2 and 2-2, we still do not see a high correction rate of the default VP focus reading in experiment 2.

As for the DO focus types, Reinhart's theory would predict that the neutral DO focus (Types 3-2 and 4-2 in Table 9) would have been more acceptable than the narrow DO focus (Types 3-1 and 4-1), within the cells of which the VP default focus would have been more acceptable than the narrow DO focus. However, regardless of the sentence types, the DO focus was interpreted prominently in all types; moreover, the VP focus did not win out at all in every case. If Taiwanese Mandarin speakers are not sensitive to contrastive stress in resolving focus association ambiguity, nor do they resort to default focus interpretation, in contrast to Reinhart's prediction, then why did the DO focus outperform the IO focus? In what follows, I suggest an alternative of default prominence that is independent of prosody.

### 5.1. *Thematic prominence of the DO*

As discussed in Section 2.3.3, the DO is considered to be more basic to the predicate than the IO based on Dik's (1997) crosslinguistic generalization, and the facts of extraction in Chinese. Moreover, it is mentioned that the "topic-worthiness" of Thematic Hierarchy (e.g., Givón 1984, 2001) can be understood in terms of topic-focus information structure in the postverbal field. The IO tends to be a postverbal topic, and the postverbal DO tends to be a focus of discussion. It follows that when the DO is topicalized to the left peripheral topic position, it suggests a defocusing process, cf. defocusing phenomena via movement in Zubizarreta (1998), Drubig (2003), etc.<sup>38</sup>

One possible factor that resulted in the high correction rates of the DO focus may be due to the design of the test sentences. In a context like (29'), one might consider throwing events involving two receivers, Penguin and Dolphin, and their respective received objects, outlined in (40). The four types of sentences designed in this study are illustrated in (41) with expected truth values, also summarized in Tables 6 and 9. The expected value judgments of the DO focus test sentences as in (41c) and (41d) comply with the receiver-object pairing outlined in (40a) and (40b)



respectively, whereas the expected answers of the IO focus, (41a) and (41b), are just contrary to the pairing in (40).

- (29') a. *Tarzan threw a fish to Penguin.*  
 b. *Tarzan threw a fish and a boat to Dolphin.*
- (40) a. {Penguin, a fish}  
 b. {Dolphin, a fish, a boat}
- (41) a. *Tarzan only threw a boat to [Dolphin]<sub>F</sub>.* → True  
 b. *Tarzan only threw a fish to [Penguin]<sub>F</sub>.* → False  
 c. *Tarzan only threw [a fish]<sub>F</sub> to Penguin.* → True  
 d. *Tarzan only threw [a boat]<sub>F</sub> to Dolphin.* → False

The pairing of the objects with the receivers in (40) may lend support to the above account of the DO prominence. The (animate) recipients may be perceived as known individuals who were given certain objects, which are considered the focus of attention. Again, the contrastive stress is not a primary cue for sentence disambiguation, as noted in Section 2.3.1, syntactic devices (e.g., coordination conjunction) preempt contrastive prosodic marking.

Before leaving this section, a possible prosodic account for the results might be explored. As shown in Section 3.3.1, there existed more IO/DO focus variations in the dative construction than those in the DOC. It may suggest that in addition to the primary notion of thematic/syntactic prominence, the default prosodic prominence discussed in Section 2.2.1 might not be totally out of the picture (cf. the default prominence in Büring 2006) for those speakers who did distinguish the IO from the DO in the dative construction. Thus, it is suggested that in the DOC the DO is integrated with the predicate forming one focus/accent domain, and the IO is not autonomous. In contrast, the DO and IO in the dative construction may form separate domains, both being autonomous, resulting in the possibility of either foci. Substantiation of this suggestion requires further study and is beyond the scope of this paper. This paper, however, suggests that prosody is not the primary factor for sentence disambiguation.

## 5.2. *Limitations of the experiments*

As mentioned before, the test sentences did not sound very natural to some subjects. However, this apparent problem is justifiable, since Taiwanese Mandarin speakers tend not to use contrastive stress to resolve focus association ambiguity. Though the use of emphasis may sound exaggerated to them, the purpose of the experiment was achieved in the sense

that the designer aimed to provide an audible phonetic prominence to elicit their judgments. Their responses even lent strong support to the claim that Chinese speakers were insensitive to contrastive stress for sentence disambiguation.

Another limitation might come from the short time span for judging and no picture being shown to the subjects when making judgments in the first experiment. Although each story was accompanied by three to five pictures shown through the PowerPoint file, with an interval of one second, the subjects had only five seconds to judge the target sentence with a blank page on the screen. The subjects heard a short chime before each judged statement. It was hoped that by not showing pictures to them while they were listening to the tested sentence, they could concentrate on the oral statement, instead of judging the sentence by viewing the pictures. Therefore, one potential problem might be their short-term memory capacity.<sup>39</sup> Nevertheless, in order to remedy this limitation, the second experiment added a summary picture which was displayed after each story when the test sentence was uttered. In addition, the interval time for giving the responses was lengthened from five seconds to fifteen seconds. It seemed that the results of these two experiments did not differ too much.<sup>40</sup>

In addition to the dative construction which was examined in the previous studies, this study incorporated the DOC as well. As mentioned in Section 2.3.1, Chinese has other types of preverbal object constructions: the preverbal DO in the *ba*-construction, or the preverbal IO in *gei* 'to' phrases. Further research is called for to investigate whether contrastive stress facilitates resolving disambiguation in these constructions, whether DO focus behaves as prominently as in the sentence types in the current study, and if there is any preferred structural *zhi* focus associate position: with its adjacent element or the sentence final argument. I will leave these issues for future research.

## 6. Conclusion

Based on our two experiments, this paper articulates possible reasons for the Chinese results being in disagreement with those from English-speaking children (Gennari et al. 2001 and Gualmini et al. 2003) and Dutch children (Szendrői). Taiwanese Mandarin adult speakers were insensitive to contrastive stress in resolving focus ambiguities. Moreover, it has been attested in this paper that the DO was interpreted more prominently than the IO, being ascribed to the thematic prominence of the Theme argument with respect to its readiness to be focal and the "topic-

worthiness” of the Recipient argument. It is also due to the syntactic generalization of the basicness of the DO and the DO extraction data. The results of the study challenge the standard assumption of the correlation between contrastive stress and sentence disambiguation. For a language in which stress is not lexically distinctive and does not primarily employ prosody for disambiguation, it is suggested that other factors, such as thematic prominence, syntactic relation, or contextual information, may contribute to ambiguity resolution. Eventually more studies are needed to better understand to what extent prosody contributes to resolving focus associate ambiguity in typological different languages. The study calls for future scrutiny of the application of theoretical prosodic issues to tonal languages in terms of the interplay between sentence neutral stress and the associated foci, and the representation levels of focus, e.g., Reinhart’s interface theory.

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### **Appendix 1.**

If one were to uphold the universality of the main stress theory and apply it to Chinese, the current results might suggest that Chinese adults, though not sensitive to contrastive stress in resolving ambiguity, always resort to the nuclear stress (in the dative construction and DOC types), which tended to consistently fall on the DO, in contrast with the most embedded element in other languages (e.g., Cinque 1993). One may entertain the possibility of Feng’s (2003) G-NSR in Chinese (42), adopted from the NSR in Zubizarreta (1998), and one might stipulate that the DO in the DOC and the dative construction is always governed by a selector that licenses the DO’s nuclear stress.

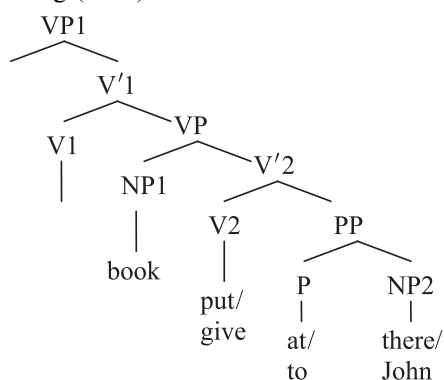
(42) G-NSR in Chinese (Feng 2003)

Given two sister nodes C1 and C2, if C1 and C2 are selectionally ordered, the one lower in the selectional ordering and containing an element governed by the selector [emphasis mine] is more prominent.<sup>41</sup>

Feng’s G-NSR is motivated to explain the constraint of double post-verbal elements (such as an object co-occurring with location PPs, duratives/frequentatives, etc.), and the prosodic constraint on the relative heaviness of NP1 and NP2.<sup>42</sup> According to his analysis in (43), a transitive internal

argument NP1 receives the nuclear stress after the verb is moved from V2 to V1. But the PP cannot stay in the canonical position and has to be “emarginated” to be adjoined to the higher VP, and its NP2 is lighter than NP1. When a PP adjunct intervenes between the verb and the internal argument by the movement of V'2 [V2+PP] to V1, P is then merged with V to enable the “selector” V to govern the internal argument to be assigned the nuclear stress. The NP2, preceding the internal argument NP1, is therefore lighter than NP1.

(43) Feng (2003)



If we were to adopt his analysis and change the locative NP2 to an IO (cf. Soh 1998), the following theoretical consequences and empirical problems need to be considered. First, why does Chinese G-NSR stipulate a selector government in the NSR, but not in other languages? Moreover, it is not clear which argument in triadic constructions is considered to be ordered lower selectionally. If one were to claim that the DO is the lower one and assigned the NS, given that a prosodic heaviness constraint accompanies the G-NSR in Feng's analysis, it is not clear which function of the G-NSR would come into play when the postverbal argument order is equally possible and the arguments are of equal prosodic weight, e.g., the disyllabic IOs and DOs in our examples.<sup>43</sup> Moreover, Feng's G-NSR aims to account for the obligatory syntactic movement of postverbal elements, but it is not clear why Feng's G-NSR, which constrains obligatory syntactic movement in his work, would not do the same thing to the internal arguments in triadic constructions. Another question in response to Reinhart's interface strategy is why neutral focus in Chinese does not project higher up to VP (e.g., Selkirk 1984) as evidenced in experiment-2, granting the VP default (economical) interpretation. It seems that more problems need to be resolved before we could adopt versions of NSR in Chinese, and I will leave this issue open here.

Appendix 2.

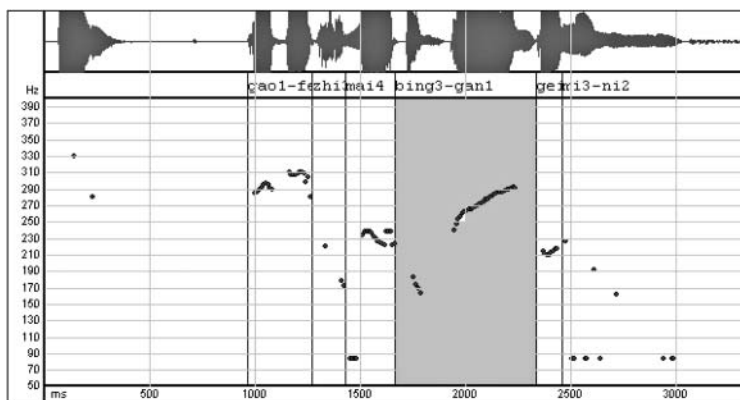


Figure A-1. Pitch contour of sentence (S4): DO focus in DAT type

(S-4) *Gaofei zhi mai BINGGAN* (669 ms./highest pitch 295 Hz)  
 Goofy only sell cookie  
*gei Mini.*  
 to Minnie  
 ‘Goofy only sold a COOKIE to Minnie.’

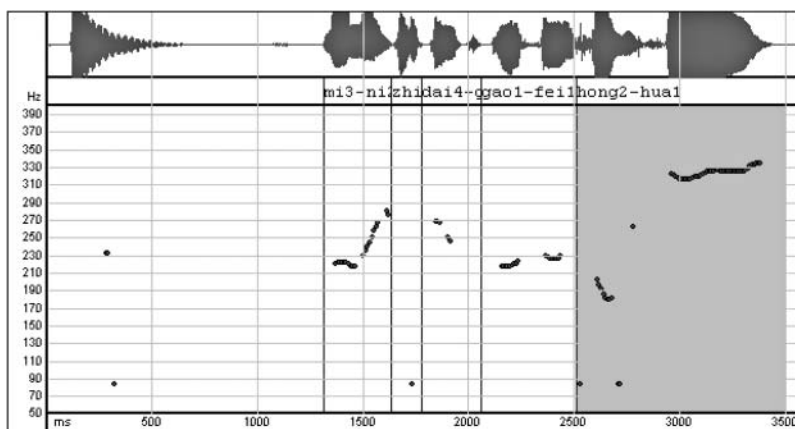


Figure A-2. Pitch contour of sentence (S11): DO focus in DOC type

- (S-11) *Mini zhi dai gei Gaofei HONGHUA*  
 Minnie only bring to Goofy flower  
 (925 ms./highest pitch 338 Hz)  
 ‘Minnie only brought Goofy a FLOWER.’

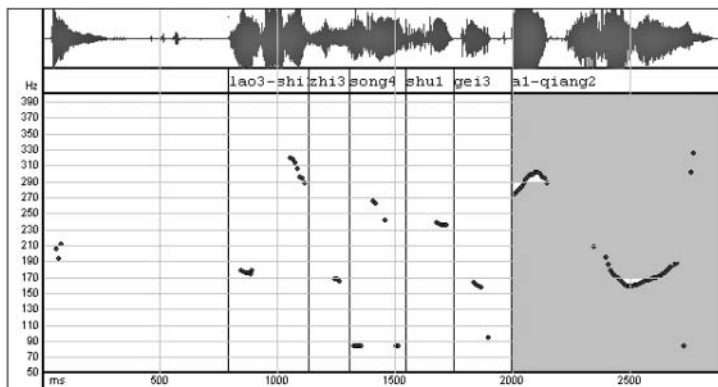


Figure A-3. *Pitch contour of sentence (S1): IO focus in DAT type*

- (S-1) *Laoshi zhi song shu gei A-QIANG*  
 Teacher only give book to John  
 (850 ms./ H: 305 Hz, L: 162 Hz)  
 ‘The Teacher only gave a book to JOHN.’

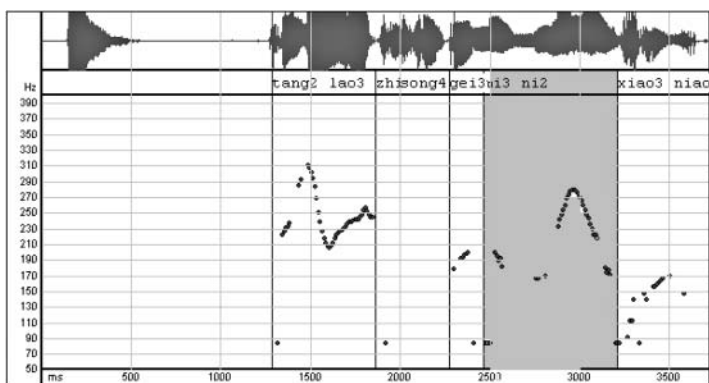


Figure A-4. *F-contour of sentence (S1): IO focus in DOC type*

- (S-9) *Tanglaoya zhi song gei*  
 Donald.Duck only send to  
*MINI* (751 ms./ Highest pitch 282 Hz) *xiaoniao.*  
 Minnie bird  
 'Donald Duck only sent MINNIE a bird.'

## Notes

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- For ease of discussion, I will use 'Chinese' to refer to Mandarin Chinese and Taiwanese Mandarin Chinese.
  - The focus structures in (ia) to (iiia) and the structured properties (ib) to (iiib) are presented by von Stechow (1991), who also specifies multiple foci associated with *only*, by substituting two variables for the focused phrases.
    - [VP introduced [<sub>F</sub> Bill] to Sue]
      - $\langle \lambda x$  [introduced x to Sue], Bill  $\rangle$
    - [VP introduced Bill to [<sub>F</sub> Sue]]
      - $\langle \lambda x$  [introduced Bill to x], Sue  $\rangle$
    - [VP introduced [<sub>F</sub> Bill] to [<sub>F</sub> Sue]]
      - $\langle \lambda xy$  [introduced x to y], Bill, Sue  $\rangle$
  - Readers are referred to these articles for a more detailed discussion of these arguments.
  - The participants in Gennari et al. (2001) were basically the same group as Gualmini et al's (2003), as pointed out by Andrea Gualmini (p.c. 2007).  
 Note that children's insensitivity to contrastive stress effects on disambiguation should not be mistaken for children's inability to recognize or use stress (e.g., children may recognize or use stress, reported by Bloom 1970; Brown 1973; Menyuk 1969; Atkinson-King 1973, and Hornby and Hass 1970, etc.).
  - Reinhart (2006) argues that focus itself is not encoded syntactically; rather, it is identified at the interface, where both the LF (Logical Form) and the prosodic structure of the utterance are available, (vs. the prior Spell-out level in Zubizarreta [1998]).
  - Cinque (1993: 265) assumes that in the double object construction the IO is higher than DO (e.g., Kayne 1984; Barss and Lasnik 1986; and Larson 1988), and in the dative structures the DO is higher than the IO (Larson 1988).

7. Instead of arguing against the AS approach, Göbbel (2005) proposes the asymmetric behavior of the IO in DOCs and dative constructions is independently motivated by a “control property” that is involved in the DOC but not in the dative construction. When there is an alienable relation between the IO and the DO in a DOC, the IO is an (animate) volitional subject and in “control” of the object. Hence, the IO in a DOC, being prosodically autonomous, does not integrate with the predicate to form a focus domain. This point can be illustrated by the contrast between Göbbel’s (2005) examples in (ia) and (ib) in a context of (i). The IO in a DOC is focused but does not presuppose a salient set of alternatives; consequently, (ia) renders a presentational (information) focus reading, rather than a narrow focus as in (ib).

(i) *I know that John has sold his old wardrobe, but I don’t know to whom.*

- a. *He sold his NEIGHbour the old wardrobe.*  
 b. *??It was his NEIGHbour that he sold the old wardrobe to.*  
 (Göbbel 2005: 259 #69)

Göbbel’s account may predict that when the IO is not accented but the DO is in the DOC, the “control” property will not surface. However, it is not clear if this judgment is always that clear of a clue. I will not further pursue this approach here.

8. The F-marking of non-argument elements, APs, adjuncts, etc., is able to project in Büring (2006).  
 9. In his discussion of the prosodic phrasing in German DOCs, Büring (2000) still bases his ranking mechanism on competing conditions, such as “adjacency” (to the predicate) and “end stress”, as traditionally assumed.  
 10. The children in the study ranged in age 4;01 to 5;08, and the mean age was 4;08.  
 11. The children in the study ranged in age from 4;3;1 to 5;8;19 (mean age was 4;9;26).  
 12. Szendrői’s (2003) Dutch dative sentences are repeated below.

- (i) a. *Hij heft alleen een stoel naar KNORRETJE gegooïd.* — Neutral stress  
       He has only a chair to Piglet thrown  
       ‘He only threw a chair to PIGLET.’  
 b. *Hij heeft alleen een STOEL naar Knorretje gegooïd.* — Marked stress  
       he has only a chair to Piglet thrown  
       ‘He only threw a CHAIR to Piglet.’

The children’s ages ranged from 4;01 to 6;10, with an average age of 5;05.

13. The asterisk-marked responses are predicted to be more difficult to judge according to standard view.  
 14. Although intensity may also be one parameter of stress, Jin (1996: 205) concludes that “F<sup>0</sup> and duration, but not intensity, are related to stress in general.”  
 15. Previous studies of focus-sensitive adverbs basically followed the general supposition (cf. Jackendoff 1972) that a focus particle associates with its focus associate in its focus range, such as focus particles in Hole (2004), the negator *bu* in Lee and Pan (2001), and *lian* . . . *dou* ‘including . . . all/also’ ‘even’ in Shyu (1995).  
 16. Hole (2004: 286) notes that while (ia) has a VP-scope reading of *zhi*, (ib), with the post-verbal object being fronted, must receive a narrow focus reading; also see Zhang (1997: 22).

- (i) a. *Laowang zhi he CHA.*  
       Laowang only drink tea  
       ‘Laowang only drinks tea.’  
 b. *Laowang zhi-you CHA \*(cai) he.*  
       Laowang only-have tea (then) drink  
       ‘Laowang drinks only tea.’



Proposing the direct object after *zhi* with ditransitive predicate seems to be less natural, however, and it occurs only in non-past volitional contexts with a preferably definite direct object argument.

- (ii) *Tarzan zhi diu le xiaochuan gei Haitun.*  
 Tarzan only throw ASP small-boat to Dolphin  
 'Tarzan only threw a small boat to Dolphin.'
- (iii) a. *?#Tarzan zhi-you zhesao xiao-chuan cai diu le gei Haitun.*  
 Tarzan only-have this.CL small-boat then throw ASP to Dolphin  
 'Only this small boat did Tarzan throw to Dolphin.'
- b. *Tarzan zhi-you zhesao xiao-chuan cai hui diu gei Haitun.*  
 Tarzan only-have this-CL small-boat then will throw to Dolphin  
 'Only this small boat will Tarzan throw to Dolphin.'

Additionally, the subject focused by *zhi* has to be preceded by *you*, an existential verb.

- (iv) *Zhi-\*(you) Tarzan diu le xiaochuan gei Haitun.*  
 only-have Tarzan throw ASP small-boat GEI Dolphin  
 'Only Tarzan threw a boat to Dolphin.'

17. In general, it seems that native Mandarin speakers from northern China tend to employ contrastive stress more often than Taiwanese Mandarin speakers.
18. While constituent ordering helps manage ambiguity, Wasow (2002), based on his empirical results, suggests that "ambiguity avoidance is at best a minor influence on constituent ordering" (p. 106). Among various disambiguation means, such as prosody, and shared common background or knowledge, he suggests that "prosody is not necessary for disambiguation; context and world knowledge are often sufficient to direct a listener to the intended interpretation" (p. 108).
19. In a canonical *ba*-construction of an SVO sentence, with appropriate semantic conditions (such as the notion of "affectedness/disposal") and (adjectival) predicates, the *ba*-construction results in *S-ba-O-V*. See Li's (2005) comprehensive survey of this construction.
20. I owe this judgment to Rong-fu Chung, Mei-chi Tsai, and Ing-er Huang.
21. It seems that the *ba*-phrase in (25), (26) and (25') has dual status. It functions as a contrastive focus/topic in the former (25), but as a backgrounding topic in the latter (25').
22. The movement of the IO tends to be prohibited except when there is an obligatory pronoun copy in the gap position. Note that in (i) the DO is topicalized while the IO is focused by *zhi-you* 'only-have'.
- (i) (Shuo-dao Hongloumeng) *Zhi-you [Lisi], Zhangsan cai hui*  
 speaking of Red.Mansion.Dream, only-have Lisi, Zhangsan then will  
*song gei ta.*  
 give to him
- 'Lit: (As for the Red Mansion Dream, only Lisi, Zhangsan will give (it) to him.'
23. This paper does not aim to pursue the argument/adjunct status of the IO, but assumes it is one of the "arguments" of the constructions in discussion; see the discussion in Göbbel (2005).
24. One of the reviewers wonders if Partee's (1999) second occurrence foci (SOF) in (iB) may be factored in our results; namely, the main accents of sentences are not to interact with the focus associate in the second occurrence of *the graduate student*.
- (i) A. Eva only gave Xerox copies to the GRADUATE STUDENTS.  
 B. No, PETER only gave Xerox copies to the graduate student.

- Note that in the current study all the test sentences occurred only once in that context. It is not clear to me how the SOF effect would play a role here.
25. Büring's (2006) default prosodic rules that map syntax onto prosodic structure rank adjuncts higher/more accentual than arguments. Moreover, his Focus Prominence rule that relates to information structure can override the default prosodic structure. His theory, however, does not have a say in accounting for the IO/DO asymmetry in triadic constructions. I will leave this issue open.
  26. Givón (2001 Vol. 1, p. 198) states that "[t]opicality is fundamentally a cognitive dimension, having to do with the focus of attention on one or two important events-or-state participants during the processing of multi-participant clause".
  27. The relative thematic prominence discussed here is worthy of comparing it with Hajičová and Sgall's (1987) "systemic ordering" of theta roles embedded in the notion of the scale of communicative dynamism. The order of Address-Theme establishes a relative topic-focus relation, and the reverse of the order requires Theme to be included in the topic. Due to space limit, I will not further pursue this issue here.
  28. The prohibition against IO extraction may be independently due to other syntactic reasons, such as the restriction on A'-extraction of the IO (Emonds and Whitney 2006: 94) rather than semantic reasons.
  29. There is a potential question concerning the object bare nouns used in the experiments. As one of the reviewers notes that post-verbal bare nouns are more likely interpreted as indefinite, hence new information, this could contribute to the predominant DO focus reading results to be discussed in Section 3. The reason why bare DO noun phrases were used instead of noun phrases with the (demonstrative-) number-classifier-noun order was to avoid the unwanted contrasting of the cardinals or demonstratives that happened in my pilot study. I also assume that the DOs and IOs in the test sentences have already been "activated" (Lambrecht 1994) in the discourse contexts; hence, the new information reading can be suppressed.
  30. Stressed elements were marked with capitals.
  31. Slightly different from the context clue implemented in the second experiment of Gualmini et al's study, the context clue here was meant to deepen the participants' impression of the story-ending.
  32. The sound files were not normalized to ensure the perfect acoustic stability. We acknowledge this limitation, but are confident the sound quality between the files was quite consistent.
  33. It is not clear to me why only S-2 with IO focus is judged correctly with a high percentage (67%), whereas other IO focus sentences were judged uniformly lower than DO focus sentences. It cannot be the practice effect (occurring in the order of 13), since S-9 (IO focus) occurring last in order was responded to with a low correct percentage (19%).
  34. The positive correlations between IO foci are pairs of DATIVE 1 and 5 and DOC 9 and 13 ( $r = .541$ ), DATIVE 2 and 6 and DOC 9 and 13 ( $r = .306$ ), and DATIVE 2 and 6 and DOC 10 and 14 ( $r = .479$ ). The positive correlations between DO foci are pairs: DATIVE 3 and 7 and DOC 12 and 16 ( $r = .381$ ), DATIVE 4 and 8 and DOC 11 and 15 ( $r = .219$ ), and DATIVE 4 and 8 and DOC 12 and 16 ( $r = .256$ ).
  35. It is shown by the negative correlation pairs: DATIVE 1 and 5 / DOC 12 and 16 ( $r = -.398$ ,  $p < .01$ ), DATIVE 2 and 6 / DOC 11 and 15 ( $r = -.234$ ,  $p < .05$ ), and DATIVE 2 and 6 / DOC 12 and 16 ( $r = -.326$ ,  $p < .01$ )
  36. Again the negative correlation pairs include: DATIVE 3 and 7 / DOC 9 and 13 ( $r = -.247$ ,  $p < .05$ ), DATIVE 3 and 7 / DOC 10 and 14 ( $r = -.426$ ,  $p < .01$ ), DATIVE 4 and 8 / DOC 9 and 13 ( $r = -.371$ ,  $p < .01$ ), and DATIVE 4 and 8 / DOC 10 and 14 ( $r = -.335$ ,  $p < .01$ ).

37. Four students wrote in their feedback for the first experiment, that they noticed the somewhat unnatural stress used and asked if we could have just spoken in a more natural way. The overall results may suggest that the subjects of the experiments disregarded the role of stress. Although a qualitative survey might have been conducted to determine the validity of this option, as suggested by one of the reviewers, it is practically difficult to implement in consideration of the fatigue effect, given the fact that the current experiment already took 30 minutes. I acknowledge this limitation.
38. The prominence of the DO may provide an empirical support for the obligatoriness of *only* association with focus (Schwarzschild 1997). Given the fact that during the storytelling process both the IO and the DO were contextually activated, but when it came to being associated with *zhi*, the DO focus associate was quite consistently chosen by the participants.
39. In Kang's pilot study (of nine subjects other than the ones in current experiments) and the current study, however, very few (fewer than three) subjects reported this concern.
40. In Experiment 1, the stimuli were arranged in two different orders to test 3 groups of subjects. However, in Experiment 2, only one order of the stimuli was used. As pointed out by one of the reviewers, there is a potential problem of priming effects. I acknowledge the defect of the study.
41. The Government was defined by Feng (2003) as follows:  
 $\alpha$  governs  $\beta$  iff  $\alpha$  is an  $X^0$ , and  $\alpha$  c-commands  $\beta$ ,  
and every branching node dominating  $\alpha$  dominates  $\beta$ .
42. Even though Feng (2002) also mentions the argument alternations in ditransitive constructions which were ascribed to the heaviness of the argument or the newness of the information, he (2003) does not articulate how his (G-)NSR could be applied in order to account for the free alternation cases with equal phonemic length of the two arguments; see Shyu's (2005) questioning prosodically motivated object movement.
43. There is only one monosyllabic word, as in S-1.

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