

Gesture in Signing: A Case Study from Taiwan Sign Language*

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Sign languages are understood to be fully formed, natural human languages. Studies of the phonological, morphological, and syntactic structure of sign languages, also of the psycholinguistic and neurological processes involved in sign language production and comprehension, reveal analogs to spoken language structures and processing at every level. It seems reasonable to assume, therefore, that the gradient gestural, prosodic, and conceptual phenomena that are universally a part of spoken language use must somehow also be a part of sign language use. This case study of a small set of referring forms in Taiwanese Sign Language (TSL) uses a story-telling elicitation technique that has proven, over years of research with hearing speakers of many different languages (McNeill 1992), to elicit plentiful yet reliable gesturing. Further, the eliciting stimulus, an action-packed cartoon, is plotted in such a way as to prompt hearing speakers to highlight key events in the cartoon story line with vivid iconic gestures and speech prosodic emphasis. Cartoon narrations were elicited from nine adult native signers of TSL. The descriptive analysis focuses on intervals in which they described the key cartoon events and reveals patterns in the TSL signing suggestive of gradient gestural and prosodic patterning, co-produced with sign categorical representations. Three types of co-production were observed and are described, including iconically representational modifications of **classifier handshapes**. These results are relevant to a growing body of research and theory on the role of gradient varieties of conceptualization (imagery) and expression (gesture and prosody) in language production, both in spoken and signed languages.

Key words: sign language, Taiwan Sign Language, gesture, prosody

1. Introduction

Linguistic research beginning with Stokoe (1960) has succeeded in identifying an extensive array of characteristics shared by signed and spoken languages, and has estab-

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lished unequivocally the status of sign languages as fully formed, natural human languages. This research has particularly focused on **design features of human linguistic systems** (Hockett 1960, Supalla 1982, 2003), such as arbitrariness of form-meaning pairings, and also on elucidating a framework of categorical oppositions that is the basis for contrastive analyses of language's meaningful units (Stokoe 1960, Stokoe et al. 1965, Klima & Bellugi 1979, Padden & Perlmutter 1987, Neidle et al. 2000). Neurolinguistic and psycholinguistic research motivated by the same paradigm (Poizner, Klima, & Bellugi 1987, Corina 1998, Emmorey 2003) has further identified facts of neurological and psychological processing in deaf signers indicating that sign language organizes many aspects of language production and comprehension comparably to how spoken language does, in terms of phonological, morphological, and syntactic processing.

A strong assumption that informs much of this linguistic, psycholinguistic, and neurolinguistic research on sign language and the deaf is that it is possible and useful to make a clear distinction between which processes and phenomena of natural language use should be considered truly linguistic and which are "paralinguistic." Liddell (2003b), whose own recent work on use of signing space does not acknowledge this distinction, notes that, "in order to demonstrate that something is linguistic [in this paradigm], one must show its categorical nature" (p.70). An identification of the linguistic with the categorical constrains much of linguistic research methods and theory, generally. This has deep roots in the paradigm, going back to Saussure (1916 [1959]), as many have pointed out (e.g., Bolinger 1975, McNeill, in press). In his study of American Sign Language verbs of motion and location (cited in Liddell 2003b:71), Supalla states:

ASL [...] has universal design features in common with all human languages. Most importantly: Human linguistic systems are digital, not analogue, a fact independent of the peripheral resources (mouth, ear, or hand and eye) that are used to create the forms. (Supalla 1982:9)

The concern with illuminating dimensions of categorical patterning in sign language has

in the deaf community of Taipei. Diana Chiu additionally organized and collaborated on collecting an extensive sample of natural Taiwan Sign Language discourse data, only a small portion of which is analyzed here. Many thanks to Jean Ann, Frank Bechter, Diana Chiu, Amy Franklin, Scott Liddell, David McNeill, James Myers, Arika Okrent, Wayne Smith, James Tai, Li-Fen Ting, and Jane Tsay for enlightening discussions and guidance; also to all the participants in the first international symposium on TSL research in March, 2003. I am indebted to the many TSL signers who cheerfully gave their time and knowledge to help build a corpus of TSL data and make this study possible. Finally, I wish to thank two anonymous reviewers who made many helpful suggestions on an earlier version of this paper.

meant that a variety of gradiently patterned phenomena known to have a role in virtually every instance of natural spoken language use have thus not been very extensively studied in sign language. These include analog gesture, imagistic conceptualizations, expressions of affect and arousal, and discourse prosody (which in spoken language manifests in the dimensions of intonation, tempo, loudness, and voice quality).

The present study is a small-scale attempt to add to what has been claimed concerning a gestural dimension of semiosis in a sign language. It is in keeping with the traditional program of sign language research in the sense that, just as linguistics has for four decades explored sign language data for evidence of categorical linguistic structures and psycholinguistic processes analogous or identical to those of spoken language, here evidence is presented that sign language possesses a further dimension of behavior that typifies spoken language use everywhere: cooccurring manual production of iconic gestures. The study particularly focuses on non-citation-form productions of morphemic **classifier handshapes** in Taiwan Sign Language (TSL), specifically those that occur in discourse contexts known to elicit coverbal gestures in hearing speakers. These are analyzed as possible instances of combined sign-plus-gesture utterances in TSL. This study adds to a growing body of research that examines analog, gradient (gestural) patterning of various sorts in sign language use (Engberg-Pedersen 1993, Reilly et al. 1992, Liddell & Metzger 1998, Liddell 2003b, Emmorey 1999, Cogill 2003, Emmorey & Herzig 2003, Schembri et al., in press) and in language use generally (Bolinger 1946, 1986, McNeill 1985, 1992, Armstrong et al. 1995, Okrent 2002, Loehr 2004). This research is briefly reviewed below.

A focus on iconic gesture in sign language also, however, puts the present study at odds with traditional sign language linguistic research in another sense. This is not only because the iconicity we shall be concerned with is a domain of gradient patterning (cf. Supalla, op. cit.), but also for historical reasons having to do with early, uninformed, and discriminatory views to the effect that signed communication is dependent on pantomime, is, in effect, nothing *but* gesture. Defeating this view has been a programmatic concern of sign language research and the field has succeeded in this endeavor. No one subscribes to this view any longer. Our treatment of sign language discourse proceeds on the assumption that, just as spoken language universally is frequently co-produced with gestures, sign language, with its “universal design features in common with all human languages,” likely is as well.

Whether sign language does or does not have an identifiable gestural dimension is of concern to language theorists who take issue with the language/paralanguage distinction in linguistics’ dominant paradigm and consider gesture and other gradient phenomena to be core rather than peripheral properties of language. Theories like those of McNeill (1985, 1992), McNeill & Duncan (2000), and Kita & Özyurek (2002), for in-

stance, are based on natural spoken language data that suggest that analog, imagistic thinking and expression are integral to the process of language production. Among hearing speakers, imagistic thinking is often clearly manifested in speech cooccurring gestures. Further, the claims by Armstrong et al. (1995) regarding the evolution of human language and the processes of grammaticalization in sign language depend on the existence of a gestural dimension of patterning in all language use, spoken and signed. Finally, Liddell (2003b) and Wilcox (2004) analyze gradient sign language phenomena of several types as evidence of conceptualizations of the sort that cognitive linguistic theories posit (Fauconnier 1994, Langacker 1999). Any further evidence of meaningful, gradient gesture in natural sign language discourse, therefore, will tend to bolster theories that posit a central role for analog, imagistic conceptualization and patterning in language use, and will demonstrate the generality of such theories to language in both modalities.

1.1 Research on gradient patterning in sign language

Several researchers in recent years have considered the possibility that signing incorporates a dimension of gradient gestural patterning. **Classifier constructions**¹ have been a focus of research attention, as have pronominal reference and verb agreement. Controversial issues include whether there is anything akin to mimesis or iconic gesture in sign language utterances and whether signers' use of space for the expression of movement and referential locations is organized according to a set of categorically oppositional locations or is instead gradient, comprising an infinite number of addressable locations.

Klima & Bellugi (1979) suggested that some types of signing may be mimetic in character. Emmorey (1999:145) describes instances of apparent mimetic depiction that occur interspersed with intervals of signing. Liddell & Metzger (1998:659-660) refer to

¹ See Schembri (2003) for a discussion of the current controversies concerning use of the term "classifier construction" to label polycomponential verbs of motion, location, and handling in sign languages. Here it is used as a conventional label for the sort of sign language production that has been the focus of thinking about gradient patterning in sign language and is the focus of this case study. This is a signed utterance in which a handshape that represents a particular semantic class of entities moves along a path in signing space. There can be concurrent representation of manner of motion as well. The focal component of classifier constructions for the case study of TSL is handshape. For the purposes of this discussion, the five exemplars of classifier handshapes discussed here are assumed to have the status of categorical morphemes in TSL.

this sort of enactment as “constructed action,”² and observe that gesturing like this is a frequent occurrence in natural sign language discourse contexts. Emmorey (1999:150) also describes apparent enactments that occur simultaneously with manual signing, but are manifested in body parts other than the hands. An example of the latter is a signer whose hips sway, an iconic depiction of dancing, while the hands are producing the sign for ‘dance’.

Others have noted that the motion components of at least some classifier predicates may flow analogically from imagistic representations of paths of motion in the signer’s mind at the time of utterance. Schick (1990) and Engberg-Pedersen (1993) propose a category of movement for classifier constructions that is in keeping with this notion. Recently, Schembri et al. (in press) have compared classifier constructions used for expression of motion events by deaf signers of three sign languages with gestured productions by hearing non-signers describing the same motion events. They find that deaf signers and hearing non-signers depict movements and locations quite similarly. In contrast, handshapes used to refer to the entities in motion vary significantly by participant group. In other words, the signers of each language appear to call on a distinctive and consistent lexicon of sign forms representing semantic classes of entities, whereas the entity-referencing handshapes of hearing non-signers show no systematicity. The authors interpret these results as evidence for an analogic, gestural dimension of patterning in the movement and location components of classifier constructions, and also for the morphemic status of classifier handshapes. Emmorey & Herzig (2003) likewise report evidence indicating that classifier handshapes are categorically contrastive with one another.

The findings of Schembri et al. (in press), concerning the gradient character of signers’ use of signing space for expression of movements and locations, is in keeping with the results of many years of research by Liddell (1990, 2000a, b, 2003a, b), also, more recently, by Emmorey & Herzig (2003), on the relationship between signers’ spatial conceptualizations and the placements and directionality of their signs. In ASL utterances expressive of motion and location, Liddell finds no evidence for the “base grid” of categorically contrastive “placement morphemes” that Supalla (1982) has proposed to account for use of signing space in ASL. Liddell (2000b, 2003b) demonstrates that pronominal reference and verb “person-agreement” in ASL natural discourse can be accounted for if one assumes that signers, in constructions involving “indicating” verbs, index pronouns and other entities by pointing to locations in a gradiently organized signing space.³ Liddell (2003a) finds the same is true for classifier constructions.

² See Kegl & Wilbur (1976) for an alternative analysis of this type of signing, based on their analytic notion “projected body pronoun.”

³ Cf. “agreement verbs” (Padden 1990). For a summary of the alternative view of use of loca-

Singleton et al. (1993) and Emmorey & Herzig (2003) find little difference between deaf signers and hearing non-signers in terms of their signed or gestured, respectively, references to locations. These authors conclude, therefore, that location reference in sign language is “not specifically linguistic in nature” (Emmorey & Herzig 2003:228).

1.1.1 Extending the search for gesture in sign language

A key issue that determines the extent to which we may consider gesture in sign language and gesture in spoken language to be like phenomena is whether we observe that gestures may occur simultaneously with categorical linguistic forms in signing, as is so often the case in spoken language use. The combined sign-plus-gesture utterance about dancing described by Emmorey (1999:150) is an instance in which manual (categorical signing) and nonmanual (gestural body movements) expressions of closely related meanings are produced at the same moment in time. Such an utterance would seem to belong to the same species of joint production we routinely observe in hearing speakers, in which the mouth is articulating speech while the hands are “articulating” co-expressive gestures. A similar co-production analysis holds, but in a slightly different way, for the utterances Liddell describes as simultaneously combining both a sign morpheme (for instance, the handshape of a classifier construction) and location or movement features that are specified in relation to gradient signing space. A difference between the productions that Liddell has focused on in his analyses of signers’ use of space and the instances (such as the ‘dance’ example) discussed by Emmorey and others is that Liddell’s analysis concerns categorical sign and gradient gesture (pointing) that are produced not only at the same moment in time, but also with the same articulator: the signing hand.

Emmorey & Herzig (2003) consider the further possibility that iconic gesture may occur as gradient variation on a handshape morpheme and be perceived by recipients of the signed communication as indexing some gradient variation in whatever entity or phenomenon is under discussion. They find evidence for such attention to gradient patterning in sign language comprehension. In their study, deaf signers were instructed to pick out circular shapes of particular diameters from arrays of circles with varying diameters, as directed by signed utterances in which shape-classifier handshapes varied in size, corresponding to the varying diameters of the circles. The researchers found:

Signers were also sensitive to the gradient variations in handshape size. We hypothesize that within a contrast set, signers know that handshape size can

tions in signing space for reference, see Neidle et al. (2000), section 3.3.1, pp.30-36.

be manipulated to indicate gradient variations in size. The gradient variations may be thought of as a gestural overlay on a morphemic representation. (p.244)

However, these researchers found no evidence that ASL signers would themselves produce signs with such gestural overlays; this is in spite of being able to interpret gradient variation in the size of handshape morphemes presented in constructed stimuli. Emmorey & Herzig conclude:

Signers do not produce spontaneous, idiosyncratic hand gestures that are concurrent with manual signs; this is primarily because of constraints on bimanual coordination. (p.243)

In other words, though these authors acknowledge (in keeping with Liddell's findings) that manual sign production can incorporate gradient gestural pointing, they find no evidence that it can incorporate gradient iconic gesture.

Failure to elicit gradiently modified categorical morphemes in this instance, however, could be a consequence of elicitation strategy. Emmorey & Herzig's signing data were collected as isolated utterances in a controlled, experimental elicitation, outside of any discourse context. Such an elicitation strategy may do little to motivate production of co-sign gesture. Duncan (2003) proposes a natural discourse-based approach to exploring sign language for further evidence of iconic gestures co-produced with manual signs. The present study is an example of such an analysis in TSL. The approach makes use of what is known about coverbal gesturing in extended discourses of hearing speakers. Before presenting the TSL analysis, this method for studying gesture in spoken discourse and some relevant findings from research on spoken discourse and gesture are summarized.

1.2 Gesture in spoken discourse

Gesturing is universally a feature of hearing speakers' discourse (Kendon 1980, 2004, McNeill 1992, 2000, McNeill & Duncan 2000, Kita & Özyurek 2002, Müller & Posner 2004, Duncan, in press). This is as true of Chinese speakers as of Italian speakers, or any other cultural group, though gesture often is unwitting and may escape the notice even of participants in a conversation in which a great deal of gesturing occurs (Rimé & Schiaratura 1991). Kendon (2000) holds that gestures, witting or not, function as a communicative resource for speakers. He has described the speech and gesture of hearing speakers as "two aspects of the process of utterance" (Kendon 1980:207). The

latter statement reflects observations both of the ubiquity of coverbal gesticulation in the discourse of hearing speakers and the tendency for gestures to share strong semantic and timing relationships with speech (Kendon 1972, 1980, Schegloff 1984, McNeill 1985, 1992, Tuite 1993, Nobe 1996).

Gesturing, for the purposes of the present study and this overview of research on coverbal gesture, is broadly construed to include gradiently patterned aspects of spoken language as well. This is in keeping with Bolinger (1946, 1983) who referred to the prosodic intonational patterns of spoken language as “gesture” and reported many analyses of how bodily gesturing is coordinated with the intonational patterns of speech. More recent work has noted the close association of onomatopoesis (vocal gesture) and manual gesturing (Kita 1993). The aspects of bodily movement and speech prosody that have been demonstrated to pattern gradiently are considered for the purposes of this discussion to be two manifestations of the same semiotic dimension in human language use. In this sense, gesture is **bi-modal**; a dimension of the prosodic system of language (Duncan 2003). Support for this conception comes from the close temporal coordination of coverbal gestures and speech prosodic emphasis (Schegloff 1984, Tuite 1993, Nobe 1996); also, the shared expressive capabilities of bodily gesture, speech prosody, and onomatopoesis as dimensions of gradient patterning in language.

Speakers’ gestures, manual and vocal, manifest meanings of many different kinds. Gestures of the hands and body may be shaped and arranged in space to depict entities iconically, indicate locations, and to map the spatial relationships among entities that are topics of discourse. The hands may also depict abstractions (metaphoric gestures) and establish locations for them in **gesture space** (McNeill 1992). In regard to prosodic “gesture,” its uses for degrees of affective expression and emphasis have been extensively considered (Bolinger 1986, Ladd 1996). Okrent (2002) has further demonstrated that hearing speakers of languages such as English and Mandarin Chinese can use gradiently varying dimensions of speech prosody, such as pitch and syllable lengthening, for depictive purposes. For instance, higher versus lower pitches can be interpreted in context as depicting a flying bird’s changes in altitude. Longer versus shorter syllable durations can refer to different intervals of time, as for example in the English phrase *{It took so-o-o lo-o-ong.}*. In the latter, the categorically contrastive vowel segments are lengthened to create a gestural representation of an interval of time that the speaker feels is excessively long. In both cases, iconically depictive modifications of categorical speech forms are accomplished with no decrement to the comprehensibility of the speech forms themselves.

Such observations of prosodic gesture in spoken language highlight two phenomena of significance for the analysis of TSL forms in the present study: (1) both the vocal and the manual-visual modalities of expression display analog-gradient semiosis, on the

basis of which Okrent (2002) asserts a “modality free notion of gesture”; (2) gesture and categorical speech forms may occupy the same modality during the same interval of time, resulting in language productions in which iconic gestural representations “layer” with categorical-linguistic representations. These observations underscore Bolinger’s (1975) claims of the pervasiveness of gesture (in his terms, speech prosodic patterning) in everyday spoken language use. It is plausible to think that the same thing may be true of sign language (Okrent 2002, Duncan 2003, Emmorey & Herzig 2003, Liddell 2003b, Schembri et al., in press).

Psycholinguistic research by McNeill (1985, 1992, in press), McNeill & Duncan (2000), Kita & Özyurek (2002), and Goldin-Meadow (2003) has focused on what hearing speakers’ coverbal gestures can tell us about the moment-by-moment cognitive processes that have a role in speaking. These researchers have developed methods of analysis that exploit unwitting gesture as a “window onto thinking” (McNeill & Duncan 2000:142). A class of theories of the human capacity for language has emerged from this research. They hold that gestures are manifestations of an analog-gradient framework of meaning generation and representation that coexists intimately in psycholinguistic processing with the discrete-categorical framework of meaning manifested in the phonemes, morphemes, and syntactic units of language. The latter have been the primary or exclusive targets of traditional linguistic analysis and theory, from which a great deal of sign language research has taken its cue. On the McNeill view (1985, 1992, in press), in contrast, every utterance of spoken natural discourse is simultaneously and irreducibly both gradient image and categorical linguistic unit. This theoretical framework holds combined categorical and gradient representation to be a “universal design feature of human language.”

Just as support has been sought for other psycholinguistic theories of human language function by examining sign language for processes similar to those governing spoken language, the present study seeks further evidence in sign language for the generality of theories, like McNeill’s, that posit a central role of gesture in language use. The approach is to exploit what is known from long study of gesture in hearing speakers; specifically, what is understood of iconic gestures in particular discourse contexts. Similar discourse contexts in TSL are explored here, to examine the behavior of categorical sign forms for evidence of gradiently expressive “overlays,” analogous in function to coverbal iconic gesture. This case study focuses on TSL signers’ uses of a small set of classifier handshapes, shown in Figure 1a.

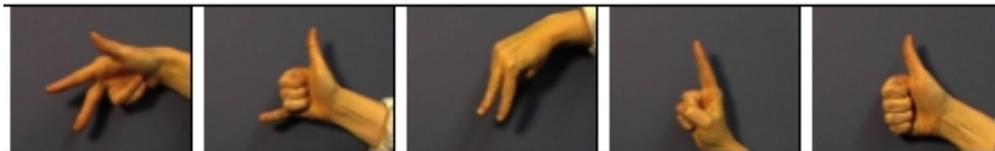


Figure 1a: Five different, frequently occurring TSL classifier handshapes, observed in the narration sample to refer to animal entities and to participate in the expression of complex motion events.



Figure 1b: An instance of use of the first of the handshapes shown in Figure 1a, the three-fingers TSL “animal handshape”, captured from a signed sequence.

Figure 1b gives another view, excerpted from an actual context of use, of the handshape that will be the particular focus of our analysis. Members of the signing community in Taipei refer to this as the **animal handshape**, although it is also observed to represent a human when the human is ambulating in some way that requires all four limbs. Each of the other four handshapes shown in Figure 1a is typically referred to as a **person handshape**, though each is observed in our TSL corpus to represent animal entities as well. Instances are described in which TSL signers produce such morphemic handshapes together with what may be “gestural overlays” (Emmorey & Herzig 2003:244) that are iconically depictive of discourse-relevant meanings, in appropriate discourse contexts.

The remainder of this section briefly outlines a method for eliciting and analyzing spoken discourse data and overviews the results that have informed the theoretical view of language assumed here. (See McNeill 1992 for a complete description.) The discourses are elicited with an animated cartoon about a cat and a bird. Each speaker tells the story from memory to a naïve listener. The participants are told only that the object of the research is to study communication. Gesture is never mentioned. A large corpus of videotaped narrative discourses by hearing speakers of more than a dozen languages has accumulated in over twenty-five years of using the cartoon to elicit storytelling. The speech of the narrations is transcribed. Occurrences of gestures in relation to intervals of speech are precisely annotated. The meanings and functions of the coverbal gestures are described. In the following sections we outline some generalizations concerning

gesture in hearing speakers' discourse that have emerged from this research and that will be relevant for the analysis of TSL forms.

1.2.1 Gesture is plentiful

Most hearing speakers gesture a great deal while telling the cartoon story, often at a rate of about a gesture per second. In spite of this, upon debriefing, participants often report being unaware of having gestured much at all. The majority of gestures elicited by the cartoon stimulus are iconically depictive of the entities and actions that contribute to the cartoon's story line. They may be mimetic, as when the speaker embodies the character's viewpoint. Or the speaker's hands may trace paths or assume the forms of entities being spoken about, manifesting an observer's viewpoint of their locations, actions, and movements. Often these viewpoints occur in combination.



Figure 2a: A Taiwanese hearing speaker describing the two target cartoon scenes in Mandarin Chinese, in which he is native; ‘outside’ in the top row and ‘inside’ in the bottom. In the bottom sequence, the orientation of the right hand (the cat), its degree of contraction, and its relation to the left hand, highlight the discourse focused aspect of the cat’s second ascent of the pipe: ‘inside-ness.’

Examples of two sequences of continuous gesture are shown in Figure 2a. This is a hearing, Mandarin Chinese-speaking, Taiwanese man. He is describing two scenes from the cartoon that occur about one minute apart. In the first of the two scenes (gestural depiction shown in the top row), the cat climbs up a drainpipe on the side of the building where the bird lives, in order to reach him. In the second of the two scenes (gestural depiction in the bottom row of Figure 2a), the cat climbs up again but on the inside of the pipe this time so as not to be observed. A feature of this second event that will be important for understanding the examples and discussion to follow is that the cartoon

drainpipe is narrow and the cat must squeeze into it. When viewing the cartoon, one sees the drainpipe from the outside as the cat moves up inside it and cannot help but imagine the cat's contracted and squeezed condition inside the pipe.

1.2.2 Gesture's temporal and semantic synchrony with speech

The Chinese speaker's gesture sequences illustrate something that is typical of hearing speakers' descriptions of these two cartoon scenes. This is that, though the speaker is describing two events from the cartoon that are similar in many ways (each involves the cat, the action of climbing, the drainpipe, and an upward path of motion) his two gestural depictions differ in several key respects. That is, while gestures depict meanings related to the accompanying speech, the process of gesture production is highly sensitive to the discourse context of that speech.

First, the gestures in the two sequences differ in terms of handshape, use of hands, and type of motion. Gestures in descriptions of the first scene (where the cat climbs up outside the pipe) tend to depict the cat's climbing manner of motion. Frequently, as in the case of the Chinese speaker shown, some handshape feature, such as convexity, suggests the cylindrical external surface contour of the drainpipe and some hopping or flapping motion that suggests the cat's climbing manner. The Chinese speaker in this instance accomplishes this with a one-handed gesture. The forms and motions of gestures in descriptions of the second scene (where the cat climbs up inside the pipe), however, typically make the cat's physical relationship to the drainpipe the primary focus instead, emphasizing 'inside-ness.'

Another respect in which the gestures in the two discourse contexts differ is in terms of their exact synchrony with cooccurring speech. Specifically, when describing the cat's climb outside the pipe, a speaker's 'climbing' gesture will typically synchronize with the main verb or verbs of the utterance that refer to that action; in this instance, Chinese *pá pá pá* 'climb climb climb'. When describing the cat's climb inside, however, gestures depictive of 'inside-ness' will typically skip the sentential main verb and synchronize instead with the figure-ground relational terms in the accompanying speech, for instance, in Chinese, with the term *lǐ-miàn* 'inside'. A typical gesture would be the index finger of one hand moving through a circular area suggested by a half-circle handshape in the other hand. In this case, the Chinese speaker moves his cupped right hand up past, rather than through, his half-circle left hand, but in a manner that also marks the way the cat's position with respect to the pipe contrasts with the preceding event.



Figure 2b: An American hearing English speaker also produces gestures highlighting the focal contrast between the ‘outside’ (top) and ‘inside’ (bottom) cartoon scenes. The first frame on the bottom shows a two-handed gesture that places the squeezed cat (right hand index finger) in relation to the pipe (left hand loose 5-hand). Hand positions, head, and body postures are then all contracted inward (compared to positions in the top row) during the speaker’s description of the cat’s climb inside the drainpipe, even as the hands execute a similar alternating climbing motion.

1.2.3 Speakers of all languages gesture

Figure 2b shows an American hearing English speaker’s descriptions of the same two cartoon scenes, ‘outside’ (top row) and ‘inside’ (bottom row). The sequence of two-handed gestures in the top row is typical of how speakers of many languages gesturally represent the cat climbing up on the outside of the pipe. It is a pantomimic (character viewpoint) gesture emphasizing a climbing manner of motion, in which the speaker’s hands are the cat’s paws moving alternately upward. In the bottom row (similarly to what we observe in the Chinese speaker, top sequence, frame 1), the English speaker initially positions his two hands to show the relationship of the cat (figure) to the drainpipe (ground). This is an observer viewpoint gesture highlighting the figure/ground relationship that is the element of contrast between the climbing event in this cartoon scene and that in the preceding scene. Note also the postural change when the English speaker, in frames 2-4 of the bottom row, again pantomimes the cat’s climb inside the drainpipe. This time he lowers his head and shoulders, contracting his torso inward, and clamps his arms to his sides, making himself occupy a smaller space. Thus, though in both scene descriptions the English speaker moves his two hands alternately to depict climbing in somewhat similar ways, he still highlights the dimension of ‘inside-ness’ in the second one, using his bodily articulators in contrastive ways.

1.2.4 Non-obligatoriness of many gestures

For hearing speakers, such gestural depictions of cartoon content are not obligatory. That is, speech is often sufficiently descriptive to convey an adequate sense of the cartoon content to the listener. Indeed, intervals without gesture do occur in every speaker's narration, sometimes including the two cartoon scenes that are the focus here. In an important sense, thus, we can say that gestures such as these, despite their ubiquity, are not a necessity. When a Chinese speaker such as the one pictured in Figure 2a utters “*Tā pá pá pá pá zài wài-miàn shàng-qù*. He climbs and climbs, climbs up on the outside.”, this, together with the surrounding spoken discourse, may be sufficiently well-specified to meet a listener's need to understand the events of the cartoon. The same is true for a description of the ‘inside’ scene such as “*Tā zuān zài shuǐ-guǎn lǐ-miàn, wǎng shàng zuān*. He bores inside the drainpipe, bores upward.”. While there are many instances in everyday language use when coverbal gestures are essential for comprehensibility (e.g., “Give me *that* pen, not *that* one!”), the sort of gestures of hearing speakers that concern us here are often not absolutely essential for an attentive listener's comprehension of the story events.

1.2.5 Variability and idiosyncrasy of gesture forms

Comparing the Chinese speaker's and the English speaker's gestured depictions of the cat's climb up inside the pipe, we observe another feature that characterizes spontaneous, coverbal gesture. This is that, in every gestural production, we can typically see some influence of individual speaker cognition, active in that moment of speaking. Speakers use their hands, heads, and bodies, often unpredictably, in a great variety of ways to depict the cat's movements. Although the analyst may see instances of similar gesture forms across many speakers' depictions of a specific cartoon event, we hypothesize that this has more to do with the fact that all the speakers (in this sort of elicitation, at least) have seen the same stimulus and will have retained very similar mental images of it, than with any tendency to represent aspects of remembered images using conventionalized gesture forms (“gesture morphemes”). Overall, a prominent characteristic of coverbal iconic gestures is their great variability.

1.2.6 Gesture and discourse focus

Returning to phenomena of gesture-speech synchrony, examples (1) and (2) below are typical of our English speakers' descriptions of the ‘outside’ and ‘inside’ scenes, respectively:

- (1) the second part is he **cli:mbs up** the drain to get uh to try and get (the bird)
- (2) then he tries to climb up **throu:gh** the drain ... mm ... **insi:de** the drainpipe

The bold face font indicates where, in relation to the speech, the iconically-depictive phases of gestural movements occurred. Enlarged font and colons (:) indicate peak speech-prosodic emphasis (higher pitch, increased loudness, and syllable lengthening). In Chinese, too, when speakers describe the cat's ascent inside the drainpipe, the word *lǐ-miàn* 'inside' is audibly louder than the neighboring words and one or another of its two syllables is typically lengthened relative to surrounding syllables.⁴ In other words, Chinese and English speakers alike tend to prosodically emphasize particular elements of the speech stream, even as they highlight those elements' semantic contents with gesture.

The cat's ascent inside, in particular, is a highly significant plot element in the cartoon, one that determines many of the events that follow. Therefore, speakers typically focus a lot of attention and discourse resources on it. The function of these gestures is conceived of as highlighting, jointly with prosodically emphasized speech, particular elements in the unfolding discourse, in a way that displays those elements' discourse-focal character. According to McNeill, such productions express the "new information" in the discourse at the moment of speaking, the information that most contrasts with what he has called the "field of oppositions" established in the immediately preceding discourse context (McNeill 1992:251-253). Here we shall refer to such gestures as marking **contrastive discourse focus**.

1.2.7 Summary

Speakers of all languages gesture a great deal in extended discourse contexts. Gesture and prosodically emphasized speech co-express and jointly highlight semantic content that is currently the focus of discourse. Gestures are often not obligatory. Their forms vary from speaker to speaker. Against this backdrop of gesture variability, how-

⁴ All descriptions of speech prosodic emphasis here are based on perception by ear, by native speakers of Mandarin for the Chinese data and by native speakers of American English for the English data. Support for the cooccurrence of perceptually-judged prosodic emphasis and gestures that we report here exists in the form of instrumental assessments of prosodic pitch (Nobe 1996) in relation to gestures in extended discourses of English speakers, as well as instrumental assessments of pitch, loudness, and syllable duration (Valbonesi et al. 2003) for a short excerpt of English natural discourse. A further study currently underway extends the Valbonesi et al. (2003) instrumental findings concerning pitch, loudness and syllable duration, and their relationship to gesture, to data from extended discourses in both English and Mandarin Chinese (Duncan et al., in preparation).

ever, a robust pattern is evident in gesture-speech combinations in the cartoon narrations. If hearing speakers recall and narrate the two cartoon scenes described above in the correct sequence, then they reliably gesturally highlight the detail with respect to which the two scenes most crucially contrast, in narrative terms: the cat's position in relation to the drainpipe as he climbs. The strong tendency of speakers of all languages so far examined to highlight points of contrastive discourse focus gesturally, and the fact that this phenomenon is well-studied in relation to the 'climb up outside' and 'climb up inside' scenes of the standard cartoon elicitation, motivate the present study's focus on these scene descriptions in the sample of TSL cartoon narrations.

2. Method

2.1 Participants

Nine adult deaf TSL signers contributed cartoon story narrations. A language background interview with each one was videotaped as part of the elicitation session. Three of the signers were deaf children of deaf parents and were raised with other deaf siblings, thus acquiring TSL as their first language. The remaining six all had their first exposure to TSL pre-pubescently, in the context of school social life. Thus, all of the participants in this study fall into the category of "child learner" (Mayberry & Eichen 1991). Further, although Mandarin speaking ability is valued in the deaf community in Taiwan, and all of these signers had had at least some exposure to speech training for the deaf, only two had acquired rather limited ability in the spoken language. All used TSL as their primary means of communication. All were recruited from one of two popular gathering places for the Deaf in Taipei, Taiwan.

The signers who served as addressees in the elicitations were a more diverse group in terms of linguistic background and TSL signing ability. One was a hearing person with many years' experience signing with deaf people in her full-time employment. The other eight were all deaf or hard-of-hearing people, only some of whom acquired TSL in childhood. However, all of them were able to participate fully in the elicitation as active addressees, reacting appropriately to the content of the signers' stories and asking questions of a sort similar to those we routinely hear listeners ask of hearing speakers in this standard elicitation task.

All participant pairs were acquaintances or friends prior to the elicitation and so were comfortable interacting with one another. All were familiar with the style and content of American cartoons of the sort used in this elicitation. The two animal characters featured in the cartoon are well known and popular in Taiwan.

2.2 Procedure

The cartoon elicitation task was described to each signer-addressee pair in TSL by a Taiwanese hearing research assistant fluent in the language. The signer was instructed to tell the story of the cartoon to the addressee, after viewing it, in as much detail as he or she could remember. The addressee was instructed to attend actively and ask questions if needed, so as to be able subsequently to retell the story him- or herself. The addressee went into another room while the signer watched the cartoon. Then signer and addressee were videotaped together as the signer told the story. When the signer signaled to the research assistant that he or she was done, if any of cartoon content had been omitted, the research assistant prompted for further recall using brief hints. The signer then related the omitted content if possible. A Sony Digital-8 format camcorder that captures data at 30 frames per second was used for videotaping.

2.3 Analysis

The narration video data were dubbed onto hi-8 format tape working copies. These were viewed using Sony professional-grade EVO-9650 hi-8 VCRs and high-resolution monitors. This equipment permits viewing of video at variable slow motion speeds, including frame-by-frame, with no loss of picture quality.

The analysis is descriptive. The narrations were first viewed in their entirety, in order to locate the signers' descriptions of the two target cartoon scenes (cat climbs up outside / inside the drainpipe), as well as to identify all uses, by each signer, of each of the five classifier handshapes shown in Figure 1a. This was done in order to get a sense of how generally each handshape is used across signers, and how interchangeable these handshapes are within each signer's repertoire. No quantitative assessment of these factors was attempted, as that sort of analysis was not a goal of this study. The goal was simply to observe whether TSL signers might switch among the forms shown in Figure 1a (each of which can presumably highlight particular semantic features), in order to capture discourse focal dimensions of meaning in their descriptions of the target cartoon scenes.

All 'outside' and 'inside' cartoon scene descriptions were excerpted from the narrations, taking care to include immediate discourse contexts, as well as any repeated or elaborated descriptions (there were many instances of this) of the events of each of the two scenes. Excerpting the descriptions facilitated repeated viewing of uses of the target handshapes in context. Slow motion viewing made it possible to see fine-grained modulations of the handshapes across brief intervals of narration time.

3. Results

3.1 Flexibility in choice of classifier handshapes

Figure 3 shows stills excerpted from the narrations of four of the signers, arranged by signer from top to bottom. In the captured frames, we see examples of uses of all five of the classifier handshapes shown in Figure 1a, repeated at the top of Figure 3. The first frame in each row shows an instance of the three-fingers ‘animal’ handshape from each of the four signers, and shows that it may be used in several different hand orientations. In each instance shown here, the handshape was part of a two-handed sign in which one hand represented the cat and the other the bird. In the first frame of the top row, the cartoon event being described is the cat and the bird sitting some distance away from each other. In the second, third, and bottom rows, the event being described is the cat chasing the bird, a frequent occurrence in the cartoon story. Across all nine cartoon narrations, this three-fingers handshape was used more frequently to represent the two animals than were any of the other handshapes shown in Figure 1a. However, there were individual differences among the signers in preference for this handshape. For instance, the signer depicted in the second row of Figure 3 used this handshape only twice in her whole narration, in the brief interval of signing from which this frame was excerpted, and then once more, in modified form, during her description of one of the two target cartoon scenes (shown in Figure 6a). The other signers all used the three-fingers handshape more frequently.



Figure 3: Examples of uses of all of the handshapes shown in Figure 1a, by four different TSL signers. All are used somewhat interchangeably by individual signers to represent the cat and bird cartoon characters. The first frames of each row show instances of the three-fingers form, which, of the five, is the most frequently observed one in this sample.

The middle frame in each row of signing in Figure 3 shows each of the four signers using the thumb-and-pinky, ‘vertical-figure’ or ‘long-narrow-object’ classifier handshape. This was the second most frequent handshape used to refer to the cat and the bird in the sample of TSL narrations. As shown, this handshape is typically oriented vertically, representing the animal standing upright, as a human would stand. In the top, third, and bottom rows, this handshape appears in one hand of a two-handed sign (the

left hand not being visible in the bottom row frame), representing the cat's stationary location with respect to some physical object. In the second row, the handshape appears in both hands and refers to the same event as is referred to in the first frame of the first row of Figure 3. This is one example that illustrates the latitude TSL signers have in choice of handshapes to represent such animal entities. In other words, thumb-and-pinky and three-fingers appear to refer to two animals sitting some distance from each other equally well.

The rightmost frame in each row gives examples, from each signer, of uses of one of the other handshapes shown in Figure 1a, to represent either the cat or the bird cartoon character. These three handshapes (thumb-up, two-fingers-down, and index-finger-up) together were used less frequently across all the signers' narrations than the three-fingers and thumb-and-pinky handshapes to represent the animals. In the top row, the signer uses the thumb-up 'masculine animate' handshape. TSL has masculine and feminine gender marking (Smith 1989), feminine being expressed with an extended pinky. These gender handshapes appear frequently in TSL classifier constructions, typically to represent male and female human beings. The use in Figure 3 represents the cartoon cat. The second and third rows show the signers using the two-fingers-down handshape to represent the cat, who at that moment is being described as pacing (on his hind legs) back and forth. Finally, in the last frame of the last row of Figure 3, we see a third description of the same cartoon event that is described in the first frame of the first row of Figure 3 and in the second frame of the second row: the cat and bird sitting a distance away from each other. In this third instance the signer uses the index-finger-up handshape, again an illustration of the interchangeability of these TSL classifier handshapes for representing animal entities in such a discourse context.

Evidence that TSL signers have the option to use these different classifier handshapes selectively to refer to the cartoon animals, in different discourse contexts where particular semantic dimensions are in focus, will be discussed in relation to the other option these signers make use of, that is, modifying the classifier handshapes themselves, as well as (apparent) mimesis. In regard to such descriptions of the TSL data, it is important to point out that what will be described in the TSL data as enactments, mimesis, constructed action, and gesture overlays are species of signing behavior that observers from another theoretical perspective (e.g., Neidle et al. 2000, Supalla 2003) would likely analyze without reference to the notion of gesture or gradient semiosis. To an observer familiar with patterns of gesture behavior in these contexts of spoken discourse, however, they appear to be good candidates for consideration as gestural phenomena. They are offered as such. The theoretical motivation for doing so was explained above. In the remainder of this section the approach is to motivate an analysis of them as gestural by referring to what is known about how discourse focus fosters

gesture production in all spoken languages. At the same time, a goal is to describe them in sufficient detail that the facts of their forms and execution are available for consideration in relation to different analytic criteria and theoretical motivations.

3.2 Citation-form classifiers, enactments, and gesture overlays

The three-fingers handshape appeared often, referring to the cartoon cat, in descriptions of the target scenes where he climbs up outside versus inside the drainpipe. A particular focus of this descriptive analysis are instances when this handshape is modified in ways suggestive of a gesture overlay on its citation form, in contexts where the modification highlights a point of contrastive discourse focus. A variety of other uses of the three-fingers and thumb-and-pinky classifier handshapes are described as well, these often occurring in combination with enactments.

3.2.1 Three-fingers handshape in citation form

Figure 4 shows descriptions by two signers who used the three-fingers handshape with no modification of its citation form. In these instances, the signers produced single utterances, with no elaboration or repetition, to describe one of the target scenes. They are included here as examples of TSL sequences that appeared to include no intervals of enactment, nor any modification of sign forms suggestive of any overlay of analog iconic images. If the observations are correct, these productions might be considered analogous to intervals of spoken discourse that are not accompanied by any sort of bodily or vocal gesturing.

The three-frame sequence of the male signer in the top row describes the cat's climb up the outside. The four-frame sequence of the female signer in the bottom row describes the climb up inside. In each sequence, the signer moves a rigid, unchanging, three-fingers handshape with respect to a stationary reference point represented by the other hand. Undetectable in the still frames of the top sequence is a slight zigzagging motion as the hand moves upward. TSL signers we consulted about such motions reported that they are standard ways to indicate manner and energy of motion. As such, they are likely instances of what Supalla (1982, 1990) and others analyze as manner-of-motion morphemes in sign language; that is, conventionalized forms unlikely to have been created at the moment of signing.

In the bottom sequence of Figure 4, the stationary reference point is a left hand handshape describing the circular drainpipe interior. The female signer's right hand moves toward, then through, the half-circle left hand. No zigzagging manner accompanied the path of motion described by the right hand, nor is the right hand handshape

modified at all as it moves through the half circle of the left hand. The focus of this production appears to have been solely the figure (cat) to ground (drainpipe) positional relationship.



Figure 4: Two instances of use of an unmodified version of the three-fingers ‘animal’ handshape, first in a description of the cat’s climb up outside the pipe, then one of its climb inside.

3.2.2 Examples of enactments and gesture overlays

In contrast to those in Figure 4, the TSL sign sequences shown in Figures 5-9 all appear to incorporate what this analysis suggests are iconic gestural performances. These occur either interspersed (similarly to Liddell & Metzger’s 1998 constructed actions) with descriptions built of categorical sign forms, or occur simultaneously with the categorical forms in one of two ways: (1) the signer enacts one aspect of the cartoon event with, for instance, the head and upper body posture, while simultaneously using categorical linguistic handshapes to describe the event (similarly to the ‘dance’ enactment that accompanied signing, described by Emmorey 1999); or (2) the signer gradually modifies a classifier handshape in a way that reflects the spatial-imagistic properties of the cartoon image being described, while retaining sufficient features of the classifier handshape that it is recognizable in context. Such handshape modifications are observed to occur in some instances in tandem with head and upper body postural performances. Thus, these descriptions of motion events can be densely encoding.

3.2.2.1 Enactments interspersed with intervals of signing

The first two frames in the top sequence of Figure 5 show an enactment of the cat’s climb up inside the drainpipe. The male signer’s head is lowered and the upper

body is contracted in and forward while the hands, cupped, flap alternately up and down. These depict the cat's manner of motion and squeezed condition inside the narrow drainpipe. As seen in frames 3-4, the signer switches to a description of the event using two classifier handshapes, the left hand in the same half-circle form we saw in the bottom row of Figure 4; the right hand in the thumb-and-pinky 'vertical-figure' handshape. The right hand then moves through and up past the left hand. In the bottom sequence of Figure 5 the female signer enacts the type of climbing that the cat does on the outside of the pipe. Just prior to and then immediately following the sequence of frames shown here are brief intervals in which this signer also moves the thumb-and-pinky classifier handshape upward. These uses occur at the onset and at the upper end of the cat's described path of motion through the signer's signing space.



Figure 5: Two instances of enacted sequences of climbing. The top row is the 'inside' cartoon scene; the bottom row, 'outside.' In each case, the enactments are interspersed among sequences like the one shown in frames 3-4 of the top row, in which citation form classifier handshapes are used to describe the same event.

Our TSL informants told us that thumb-and-pinky, in addition to being used to represent upright animates (typically humans), is also often used to mean long-narrow-object (e.g., a drinking straw or ruler), in classifier constructions. Therefore, use of this morpheme, together with the half-circle handshape in a TSL utterance describing the cat's climb up inside the drainpipe, as shown in frames 3-4 of the top sequence of Figure 5, may function specifically to describe the cat's narrowed condition inside the drainpipe. This may or may not have been the signer's goal in this instance, we cannot know; however, we see from the still frames that these two signers both also chose to enact the cat's climb in ways highlighting the discourse focal element of the cat's actions. Thus, both of the signers in Figure 5 could be said to have described these climbing events in intervals of signing interspersed with intervals of constructed action.

3.2.2.2 Gradient modification of handshape

Recall that hearing speakers gesture contrastively in their descriptions of the two target cartoon scenes, in ways that highlight contrastive discourse focal elements. This was illustrated by the excerpts from hearing speakers' narrations in Figures 2a and 2b. The two sequences for each signer in Figures 6a and 6b permit similar within-signer comparisons of the 'outside' and 'inside' scene descriptions. The top sequence in Figure 6a is the same as was shown in Figure 5. It is included again here in order to emphasize the contrasts this signer creates between her two descriptions. Note how, in comparison to the 'outside' sequence, the signer's hands pass closer to her face in her 'inside' sequence. In the latter, also, her posture is contracted inward. Initially, synchronous with this postural contraction, her left hand adopts the half-circle handshape. The three-fingers handshape in her right hand then modulates over the next few frames in a way suggestive of gradient iconic representation: the cat squeezing into the mouth of the drainpipe and beginning to move up inside it. In the videotaped signing, the interval just before the leftmost frame in Figure 6a (excluded from the sequence shown) had the three fingers of the handshape a bit farther apart and contracting slightly toward one another. In the first frame shown here they are maximally contracted, straight, and beginning to enter the circular space defined by the left hand. The three-fingers hand in this configuration then moves up through the left-hand half-circle, followed by a sharp turn to move briefly away from the signer's body (shown in the second frame here; only the two top fingers are visible). In the next two or three frames (excluded from this sequence) the hand changes direction again, to point and move upward, with the fingers still squeezed together. This exactly depicts the cat's path and manner of motion in the cartoon sequence, as he squeezes into the curved bottom section of the pipe and then moves vertically up inside it, still squeezed. Finally, shown in frames 3-4, the signer dispenses with the two classifier handshapes and depicts the rest of the climbing event in enactment mode, hands flapping alternately and head and torso continuing in the contracted posture.



Figure 6a: In the top row, an enactment of the cat’s climb up outside the pipe; in the bottom row, a modified version of the three-fingers animal handshape in the first two frames represents the squeezed condition of the cat as he climbs inside the pipe. This same meaning is expressed in an enactment that follows immediately, frames 3-4.



Figure 6b: The three-fingers handshape represents the cat and a half-circle handshape represents the pipe in both target cartoon scenes; ‘outside’ in the top row and ‘inside’ in the bottom. Both handshapes are modified to highlight the discourse focal content of ‘inside-ness’ in the bottom sequence: the half circle widens and the index and middle fingers of the three-fingers handshape curl in toward the hand, a different modification from that in the previous figure.

Similarly to the bottom row of 6a, the sequences in 6b involve the three-fingers handshape. Here, however, we see this classifier handshape used for both the ‘outside’ and ‘inside’ descriptions (top and bottom sequences, respectively). These sequences, therefore, give an opportunity to examine how signing discourse context may modulate the production of a single categorical sign morpheme. Across frames in the top row (‘outside’) it is possible to see that, as the right hand moves up in relation to the half-

circle left hand, its index and middle fingers, primarily, and the thumb to a lesser extent, wave in and out of the positions they hold when this handshape is held rigid (as illustrated in Figures 1b and 4). Such a finger-waving addition to this handshape occurs many times across different signers in our sample, suggesting that it is another conventionalized or morphemic expression of manner of motion that is applicable to this handshape in TSL. In contrast to the seeming generality of this finger-waving, the way the signer modifies the three-fingers handshape in the bottom sequence (‘inside’) is unattested in the rest of the TSL sample. It is unique to this signer and this particular production. In it, the index finger of the handshape remains extended while the thumb and middle finger curl toward the palm, making a contracted form of a different sort from the one produced by the female speaker in Figure 6a. The contracted handshape moves up toward the left hand half-circle, then through and past it. Note also that the half-circle handshape across the frames in the bottom row is widened a bit in comparison to those of the top row, a modification that permits the right hand to move through the circular space defined by the left in the ‘inside’ sequence. In the top row, the left hand’s more contracted convex shape suggests a focus on the cat’s relationship to the drainpipe exterior as opposed to its interior.



Figure 7: The three-fingers handshape represents the cat and a loose fist represents the pipe in both target cartoon scenes; ‘outside’ in the top row and ‘inside’ in the bottom. Both handshapes are modified to highlight the discourse focal content of ‘inside-ness’ in the bottom sequence.

The contrast between the top and bottom sequences of Figure 6b, between a contracted and a more open handshape representing the drainpipe in the two target cartoon scenes, is also distinctly a part of the ‘outside’ and ‘inside’ productions shown in Figure 7. This is another within-signer comparison of the two scene descriptions. In his ‘outside’ production (top row), this signer’s left hand is a loosely closed fist, whereas in the

‘inside’ production (bottom row) it is opened just wide enough for the right hand to appear to push through it. The signer’s right hand also, similarly to the sequences in Figure 6b, marks the discourse focal contrast of ‘inside-ness’ on the three-fingers handshape. This signer accomplishes this by curling his fingers in toward the palm during the interval shown in the first three frames of the bottom sequence (‘inside’). Compare this to the relatively straight fingers in the frames of the top row (‘outside’). In the bottom (‘inside’) sequence the fingers curl during the interval in which the right hand, representing the cat, is inside the left hand, which represents the narrow pipe. In the final frame, the fingers begin to straighten out as the right hand clears the constraining left hand.

Figure 8 shows another use of the three-fingers handshape that is also unattested elsewhere in the sample, in a production of the ‘outside’ cartoon scene. This same signer’s production of ‘inside’ was shown in the bottom row of Figure 4. In the first frame of Figure 8 (‘outside’) we see the instant of the signer’s placement of a right-handed, rigid, three-fingers handshape at a location marking where the cat begins his climb. The left hand then also assumes this handshape. While clearly retaining the three-fingers handshapes, the fingertips of both hands then bend inward, seeming to represent claws on the signer’s hands that now, in addition to being whole ‘animal’ classifiers, are also the paws of the cat. The palms orient away from the signer and move alternately upward to show the cat’s path and manner of motion.



Figure 8: In frames 2-4, a two-handed use of the three-fingers animal classifier, modified to simultaneously represent parts of the cat’s body: its climbing paws.

The last excerpted sequence of signing, shown in Figure 9, is offered as an example of a discourse-contextualized modification of a different classifier, the thumb-and-pinky ‘vertical figure’ handshape. In this instance it is used to depict the cat moving up through and then clearing the top of the drainpipe. The sequence is a two-handed utterance in which the left hand half-circle handshape represents the drainpipe. In the first frame, we see the right thumb extended out from the hand, as is typical for this classifier handshape (see frame 2 in Figure 1a) and is oriented vertically. The pinky, however, is extended outward only to the first knuckle. The rest of the finger curls back in toward the hand. This frame of video captures the moment when the thumb-and-pinky hand-

shape is passing through the half-circle defined by left hand. Once the right hand clears the left hand, we see the pinky begin to extend away from the hand in the second frame. By frames 3-4, the pinky is in the fully extended position typical of this handshape.



Figure 9: In a description of ‘inside’, the thumb-and-pinky handshape is modified. The pinky is initially curled in toward the hand (first frame) and then pops back to the extended position of the citation form of this handshape, after moving past the left hand, which represents the constraining pipe.

3.2.3 Further production characteristics of the signing sequences

Finally, a salient aspect of the TSL productions excerpted as still frames in Figures 4-9 is what may be described as a “deliberateness” of performance during intervals when the discourse focal elements were being described. This perceived character of the performances seems partially a function of the time it took the signers to execute their performances during these intervals, as well as of a quality of “effortful investment” in the signing, compared to often very rapid signing with the same handshapes in neighboring contexts. In the latter, the handshapes might appear very fleetingly. It seems reasonable to consider sign production characteristics like this as belonging to the prosodic dimension of TSL. If that is the case then, in TSL as in spoken languages, we have an association of intervals of iconic gesture, discourse focal events, and changes in prosody.

These last observations are impressionistic. However, tending to confirm them is the fact that intervals of signing during which focally contrastive cartoon events were being described were less subject to motion blur on video. That is, it was possible to view these sequences in slow motion without any portions appearing smeared, due to having been executed too rapidly for adequate capture and viewing at 30 frames-per-second tape speed. Further impressions of this aspect of the TSL discourse data include a tendency sometimes to pause slightly just prior to beginning a description of a discourse focal event; also, for the signer to direct his or her gaze toward the listener at these junctures. These aspects of the TSL signers’ performances were not systematically examined, yet they involve features of sign performance that are amenable to instrumental assessment. They are noted here to indicate a direction these TSL data sug-

gest for further exploration of sign language discourse prosody, as will be discussed in the next section.

4. Discussion

Prior to presenting the analysis of the utterances TSL signers used to describe the two target cartoon scenes, some characteristics of iconic gesturing by hearing speakers in the same discourse contexts were summarized. Hearing speakers' gesturing is abundant though non-obligatory, idiosyncratic, and highly variable. The gestures may manifest character, observer, or "dual" viewpoints of events being described. Together with prosodically emphasized speech they highlight contrastive discourse focal content. Across the excerpts of signing intervals from the sample of nine TSL cartoon narrations, several different means that these signers have for talking about the target cartoon scenes are observed. Each of these finds apparent analogs in descriptions of the same cartoon scenes elicited from hearing speakers, including, it is argued here, analogs to the gestural dimensions of hearing speakers' performances.

4.1 Recap of the descriptive analysis

The sign sequences shown in Figures 4a and 4b are offered as analogs of descriptions by hearing speakers that are performed without accompaniment of iconic gestures. Each signer used the citation form of the three-fingers handshape and appeared to enact no aspect of the scene content. The sequences in Figure 5 include enactments of the cat's climbing manner of motion. These are sandwiched between signed descriptions of the same events that, again, were produced using sign morphemes, the thumb-and-pinky classifier, in this case. These examples are in keeping with Liddell & Metzger's (1998) and Emmorey & Herzig's (2003) descriptions of how signers will intersperse intervals of enactment with intervals of signing in their discourse.

The sequences in Figures 6a, 6b, and 7 are instances of signing that add, it is proposed here, to the kinds of data on which researchers may base arguments for a gestural dimension of sign language. All three incorporate a modified use of the three-fingers classifier handshape suggestive of a shaping influence of discourse context on the morpheme's form. In each signer's description of the element of the second target scene that crucially differentiates it from the first ('inside' versus 'outside'), there is some modification of the handshape during the 'climb inside' descriptions that highlights the significant aspect of the figure-ground relationship. Each signer contracts the fingers of the three-fingers handshape in some way, creating a representation of the cat squeezed inside the pipe. The three signers differ in their modifications to this morpheme. In Fig-

ure 6a the signer keeps her three fingers straight while contracting them toward each other. In Figure 6b the signer curves two of the morpheme's three fingers in toward his palm, leaving the remaining one straight. In Figure 7 the signer bends all three fingers slightly inward. This variability across the three signers in the same discourse focal context tends to support a gestural analysis of their handshape modifications (McNeill 1992:22), in that gradient imagery is a source of meaning while not dictating specifics of form. If all three had modified the handshape in the same way, this would have been evidence in favor of a morphemic rather than a gestural account. Figures 8 and 9 are examples of further variability in use of classifier morphemes. Figure 8 is an instance of another kind of modification to the three-fingers handshape. It also is a character viewpoint gesture overlay on the sign form, unlike those in Figures 6a, 6b, and 7. In Figure 9 the signer chooses the thumb-and-pinky, long-narrow-object classifier to refer to the cat inside the pipe. Still, he modifies it across the signing sequence by curling the pinky in toward the palm and then popping it back out again a moment later, another instance of gesture overlay that further highlights the squeezed-figure/ground relationship, perhaps beyond what the choice of the thumb-and-pinky morpheme accomplishes, or perhaps accentuating it.

We propose that the sequences in Figures 6-9 are instances of classifier morphemes, produced in a natural discourse context, possessing gesture overlays in Emmorey & Herzig's (2003) sense. If the analysis of these TSL usages is correct, they are counter-evidence to those authors' claim that "signers do not produce spontaneous, idiosyncratic hand gestures that are concurrent with manual signs" (2003:243); rather, much as Okrent (2002) described for the medium of spoken language, signers may modify categorical linguistic morphemes gradiently to create iconically depictive representations of entities and events.⁵ Thus, across all these TSL descriptions of the two target cartoon scenes, we encounter a range of behaviors analogous to the range known to exist in the gesture modality of spoken language.

As pointed out above, the claim that these modifications to classifier handshapes are gestural is theoretically motivated. The same empirical facts may be amenable to different interpretations. Two alternatives are briefly outlined here. One is suggested by Liddell's (2003a) analysis of signers' uses of classifier constructions in ASL, the other comes from Supalla's (2003) discussion of the evidence in favor of a morphemic analysis of handshape, location, and movement features of ASL classifier constructions.

Liddell's (2003a) discussion of ASL classifier constructions notes the occurrence

⁵ Cogill (2003) suggests that productions such as these are evidence against the morphemic status of forms such as the three-fingers handshape. We agree with Schembri et al. (in press) that such forms are still properly considered morphemic and claim that, just as with morphemes of spoken languages, they are amenable to gradient gestural deformation.

of nonce forms that include novel handshape orientations and configurations as well as modifications to the handshapes themselves. An example he offers is a classifier construction used to describe a car crashing into a tree. In it, one hand is the morpheme for ‘tree’ and the other, at the onset of utterance, is the ‘vehicle’ classifier handshape in citation form. The latter consists of thumb, index, and middle fingers held out straight from the palm. Over the interval of the utterance, the ‘vehicle’ handshape moves toward the hand representing the tree, collides with it, and the fingers bend in toward the palm, indicating that the car is now wrecked. Although Liddell claims that signers’ use of signing space in classifier constructions is gradient and gestural in nature, he does not extend his notion of gesture to include spontaneously generated, nonce forms such as the modified ‘vehicle’ classifier handshape in his example. In regard to such creations he asserts that, “new forms come into existence based on the patterns (schemas) observable across the set of classifier predicates.” Liddell claims that classifier constructions containing such nonce forms constitute *de novo* lexicalizations in ASL. A criterion for excluding gesture from an account of a form like the ‘wrecked car’ handshape has to do with the equation of gesture with gradience in Liddell’s theoretical framework. According to Liddell⁶ it seems unlikely that ASL signers would ever be observed to modify the ‘vehicle’ classifier by degrees so as to denote different degrees of damage to a vehicle. Should it prove possible to elicit gradiently varying modifications of this ASL classifier or some other, much as Emmorey & Herzig (2003) attempted to elicit from their signers, a gestural interpretation of the modifications to handshape might be supported. Using this criterion, in support of the claim of gestural modifications to the TSL three-fingers ‘animal’ handshape, recall the sequence of signing represented by the first two excerpted frames of the bottom row of Figure 6a. Although the still frames make it difficult to perceive, in video one sees the three-fingers handshape collapse over an interval of several frames from the classifier citation form (shown in Figure 1b), by degrees, into the configuration in which the three fingers are held straight and almost pinched together at the tips. In the cartoon-eliciting stimulus, in fact, the cat moves through the mouth and into the initial portion of the drainpipe over an interval, so that his body becomes squeezed in parts, by degrees. Further, as noted above, the variety of modifications to the three-fingers handshape that the TSL signers produced in the target discourse context also is analogous to the variability of coverbal gesture in hearing speakers.

Supalla (2003) offers another view. He suggests that, to the extent that any sign language phenomena (for example, enactments or modifications of sign citation forms) are thought to be gestural, it is likely because they remain poorly understood due to still

⁶ Liddell, personal communication, June 2000.

incomplete analysis or to reliance on sign language corpora accumulated using inadequate transcription methods that do not enable the analyst to detect linguistic systematicities (such as categorical morphemic contrasts) in the data (pp.254-255). Supalla and others who work within the same theoretical framework would be correct to point out that the findings reported in this study are slender at best. The claim that the variability in use of the three-fingers handshape is gestural in nature is (1) highly theoretically motivated, and (2) based on a small amount of data from a sign language that has only fairly recently begun to be researched and described in detail. The analysis presented here is truly a case study of a small set of forms, primarily focused on just eighteen utterances excerpted from nine narrations. The analysis is very dependent on converging evidence from research on the robust phenomenon in spoken language of co-occurrence of contrastive discourse focal elements in speech with co-expressive iconic gestures.

4.2 Discourse prosody in TSL

If the analyses presented here are plausible, concerning the gestural and contrastive discourse focal nature of these modified classifier handshapes, this indicates a possible direction for further analysis. That is, it may be worthwhile to examine such intervals of signing for what they can tell us about discourse prosody in sign language. As was outlined in the section on gesture in spoken language above, hearing speakers give strong prosodic prominence to the intervals of speech such as those highlighted in bold face in examples (1) and (2). This prosodic emphasis is reliably perceptually detectable and its occurrence is currently being assessed with instrumental measures as well (Duncan et al., in preparation). In the speech of hearing individuals, perceptually, the emphasis clearly involves the prosodic features of increased pitch, loudness, and syllable length, possibly also brief pauses in speech directly before the intonationally emphasized syllables. It may be that a slowed, deliberate interval of signing is analogous to the speech prosodic feature of lengthening, known to create a context in which phonemic segmentals may be more completely articulated.

Noting a certain deliberateness of production during the target intervals of TSL signing, we suggest that signing sequences containing gestural overlays may be a good locus for exploration of aspects of sign language prosody that have proved challenging to study (although, see Coulter 1990, 1992, Reilly et al. 1992). We suggest that examination of such intervals may extend our understanding of what Nespor and Sandler (1999) referred to as aspects of sign language prosody other than those at the “syntax-phonology interface”, including prosodic prominence that cues discourse focus or signals “paralinguistic nuances of meaning” (p.145).

5. Conclusions

As suggested in Duncan (2003), the methods and analysis exemplified in this study offer promise as a means of exploring sign language gesture and discourse prosody. The term *gesture* in the title of this paper is specifically meant in Okrent's (2002) sense as a 'modality free notion' and it is assumed that an exploration of iconic gesture is an avenue of exploration of a language's entire system of gradient patterning, including prosody. This case study of a small set of forms in TSL focused on their use in classifier constructions. These are predicates in which a handshape that represents a semantic class is made to move in some way or to perform some action. The small sample is offered in the spirit of an "existence proof" of the potential for sign language to manifest iconic gestural patterning other than mimetic enactment.

It was noted that the behavior of sign language classifier constructions has long attracted the attention of sign language linguists as a domain where a gestural dimension of patterning may be at work. Supalla (2003:249) asks whether "classifier predicates mark the point where ASL diverges from other human languages, and lapses into the all-too-available gestural capacity for the visual medium to communicate these spatial events?" In his re-examination of the question of visual analogy in sign language, Supalla finds "[no] evidence of purely analogical, iconic representations in ASL, either in the handshapes or in the movements and manners encoded by these [classifier predicates]." These recent statements by Supalla reflect the same perspective expressed in his 1982 work, cited above in the Introduction, and also the persistent perspective in much of linguistic research, critiqued by Liddell (2003b), that gesture and gradient phenomena are not a part of language.

In spoken-language linguistics, this perspective is handled with the **language versus paralinguage** distinction discussed by Liddell (2003b) and Bolinger (1975). Those authors' treatments concern the legitimacy of making such a distinction in the first place, and the implications for theories of human language if linguists and psycholinguists do incorporate systematic observation of the gradient phenomena associated with natural language use into their research methods. Supalla's comments represent a school of thought in sign-language linguistics in which, curiously, it seems that the perspective that gesture is not a part of language is handled, not by distinguishing sign language's gradient-gestural phenomena from its categorical-linguistic phenomena, so as to exclude gradient phenomena in a principled way from analyses of categorically patterned phenomena, but rather, by *a priori* exclusion of even the possibility that gradient phenomena are part of everyday sign language use. Thus, though hearing speakers are observed, for instance, routinely to perform gestural enactments in conjunction with speaking, seemingly analogous performances by signers are postulated (within Su-

palla's framework) *a priori* to be decomposable into categorically oppositional elements. Failures to demonstrate that they are so are attributed to inadequate resources (data, transcription methods, depth of analysis) for detection of all the categorical contrasts. Supalla's statement that he is unable to find any "*purely* analogical, iconic representations in ASL, either in the handshapes or in the movements," [italics added] begs the issue of whether signed forms may layer gradient and categorical representations simultaneously. One would like a principled explanation for why sign language should restrict use of an expressive capability of the manual-spatial modality, particularly when it is established that gradient and categorical representations may simultaneously occupy a modality.

When one approaches gesture as a phenomenon integral to human language, manifestations of a gestural dimension in sign language use, far from being interpretable as any kind of "lapse" on its part as a human language, instead further strengthen claims that sign language is an instance of "a humanly possible language", with more patterns of use and expression shared in common with spoken language than the analytic and theoretical traditions of linguistics' dominant paradigm uncover (Duncan 2003). Note that when Emmorey & Herzig (2003:228) state that location reference in ASL is not specifically linguistic in nature, what they mean is that location reference is not categorical-morphemic. The theoretical paradigm assumed in the present study, however, holds that language inherently comprises gradient as well as categorical patterning and that an adequate theory of language must account for how the two frameworks function in tandem. That iconic gesture may occur simultaneously with categorical signs in natural sign language discourse thus is further evidence for this view of the fundamental nature of language.

The methods that were used in the present analysis and by the others cited (Engberg-Pedersen 1993, Emmorey 1999, Okrent 2002, Duncan 2003, Liddell 2003b, Emmorey & Herzig 2003, Schembri et al., in press; also, Cogill 2003), including comparison of data from deaf signers and hearing speakers elicited using the same stimulus materials, show promise of further illuminating the gradient gestural dimensions of sign language. Such methods, including analysis of extended natural discourse, are in keeping with Hockett's (1987) reconsideration of his 1960 conclusions concerning the design features of human languages, specifically, that situated language use incorporates a variety of phenomena that do not fall under the definitions of arbitrariness and discrete patterning, and which may only be understood by studying language "*in vivo*." Research of the kind reported here, that examines natural sign discourse, contributes to development of linguistic theories that may better account for phenomena of natural language use and may better account for language in both modalities.

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手語中的手勢：台灣手語的個案研究

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手語被認為是形式完整的人類自然語言。無論是手語的音韻、構詞、句法結構，還是手語的心理語言學及腦神經處理過程的研究，都顯示出手語和口語在所有層次的相似性。因此，我們可以合理地假設，口語中普遍存在的漸進式手勢、韻律以及概念應該也存在手語中。

本研究是有關台灣手語的指示詞。這個研究採用說故事的方式來誘導語言敘述。這個方法多年來已經被應用在許多口語的研究中，證明是一個可以取得大量且可靠的手勢的方法。此外，實驗刺激是一個充滿了動作的卡通故事。這個故事的編排促使聽常的語言使用者使用意象性的手勢和強調語氣來配合卡通中關鍵事件的進行。

我們從九位成年的台灣手語使用者中取得故事敘說的語料。我們的分析不僅著重在他們描述關鍵事件的時間間隔，也顯示與手語的範疇表徵共現的漸進式手勢和韻律。我們觀察到三種共現的現象，包括手語分類述詞如何依意象表徵而調整手形。無論是口語或手語的研究，概念化（想像）與表達方式（手勢和韻律）中的漸進式變異在語言產生過程中所扮演的角色為何，是一個愈來愈受到重視的議題。而本研究的結果和這方面的研究與理論有非常密切的關係。

關鍵詞：手語，台灣手語，手勢，韻律