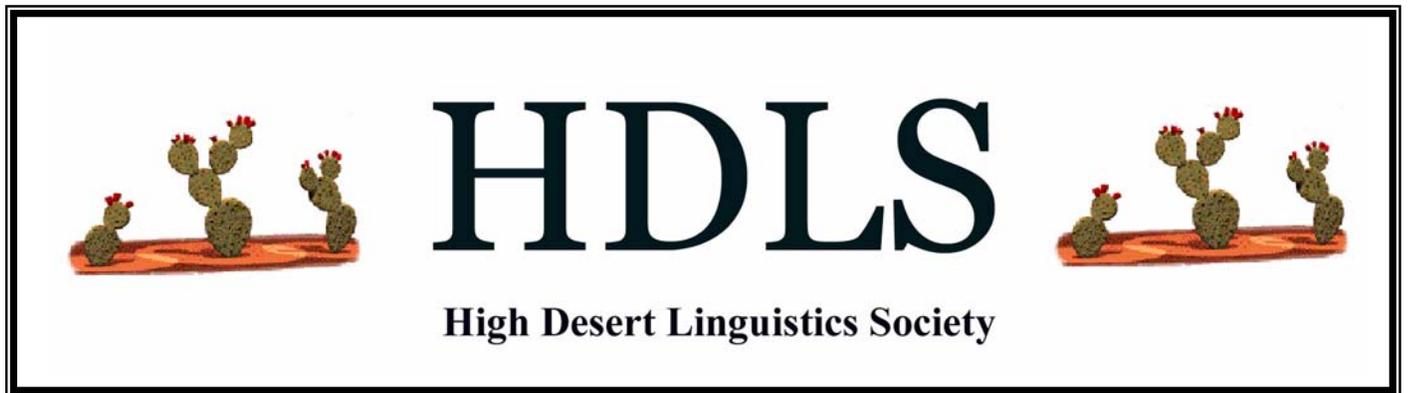


Proceedings
of the Fifth Annual
High Desert Linguistics Society
Conference

November 1-2, 2002
University of New Mexico

Edited by
Terry Cameron, Executive Editor
Christopher Shank and Keri Holley

Volume 5



High Desert Linguistics Society ♦ Albuquerque, New Mexico

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Printed in the United States of America.

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ACKNOWLEDGEMENTS

The High Desert Linguistics Society (HDLS) was proud to continue the tradition of the HDLS Conference series with its fifth meeting, held from November 1 through November 2, 2002 on the University of New Mexico campus. The HDLS Conference began as a coordinated effort of the graduate student body in the Linguistics department at the University of New Mexico. The conference was designed “to provide a forum in which students and other presenters meet to exchange ideas, research and criticism in the spirit of collegiality and support.”

An academic conference comes together only through the effort of many individuals. HDLS would like to thank Ron Langacker and Barbara King for their authoritative and thought-provoking keynote talks during the conference. We also extend our gratitude to the Chair of the Linguistics Department at the University of New Mexico, Sherman Wilcox, for his on-going support of HDLS and for his efforts in arranging for our keynote speakers; as well to Nancy Montoya, the Department Administrator, for her assistance in working with the University administration to obtain rooms, equipment and other logistical concerns. Additionally, we would like to thank the faculty of the Linguistics Department, especially Larry Gorbet and the faculty advisor to HDLS, Phyllis Wilcox, for their help and support in our efforts to both organize and carry out the conference. We would also like to recognize the generous financial assistance provided by Deputy Provost for Academic Affairs, Richard Holder, and a grant awarded by the Graduate and Professional Student Association (GPSA) to help pay for the interpreting services. In addition HDLS would also like to thank Barbara Shaffer, Elisa Maroney and Brenda Nicodemus for organizing the signed-language interpreting during the conference.

We offer a special thank you to Melissa Axelrod for organizing the end-of-conference party for which she graciously welcomed participants into her home. Finally, thanks are also due to the officers of HDLS: Christopher Shank, President; Gabe Waters, Vice President and Keri Holley, Treasurer who helped to coordinate the overall event.

In addition to the officers, HDLS would also like to thank the numerous individual volunteers who made both this conference and these proceedings possible, with their hard work and enthusiasm:

Clay Beckner, Catie Berkenfield, Susan Buescher, Terry Cameron, Li-Hsiang Chang, Paul Edmunds, Barbara Finch, Brittany Kubacki, Jim MacFarlane, Candace Maher, Dawn Myers*, Elisa Maroney, Paula McClusky*, Mami McCraw, Brenda Nicodemus*, Dawn Nordquist, Dan Olsher, Dan Parvaz, Lisa Shannon, Marianne Skahan, Laurel Standley*, Sara Ritthaler, Jay Williams, Lucas Wilson

High Desert Linguistics Society
June, 2004

* Volunteer signed-language interpreters

TABLE OF CONTENTS

Windowing of Attention in Simultaneous Constructions in Irish Sign Language (ISL) <i>Lorraine Leeson and John I. Saeed</i>	1
The Joy of Tawahka: An Overview of Some Aspects of the Phonology, Morphology, and Syntax of a Misumalpan Language <i>David R. Margolin</i>	19
Theme, Thought, and Theory: Jicarilla Apache Classificatory Verb Stems <i>Candace Maher</i>	29
On German and Japanese Dative Constructions <i>Carlee Arnett and Kyoko Masuda</i>	43
From r to ʁ via z and l: Rethinking the History of French /r/ <i>Eric Russell Webb</i>	55
French Aspirate-h Isn't Aspirate, Isn't <h>, and Isn't French <i>Douglas C. Walker</i>	65
The Perfect Correspondence Between Gender Features and Gender Forms In Italian <i>Franca Ferrari-Bridgers</i>	75
The Allomorphy of the Italian Masculine Definite Article: A Usage-Based Account <i>Cinzia Russi</i>	87
Toward Automated Scene Generation From Textual Descriptions <i>Dan Tappan</i>	99
Connecting Lexical Knowledge to Distributed Real-World Knowledge in the Semantic Web <i>Steve Legrand and Pasi Tyrväinen</i>	109

WINDOWING OF ATTENTION IN SIMULTANEOUS CONSTRUCTIONS IN IRISH SIGN LANGUAGE (ISL)

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1. INTRODUCTION.

Irish Sign Language (ISL) is the third language of Ireland with approximately 5,000 Deaf people using ISL as their first or preferred language (Burns 1997, Matthews 1996). The sociolinguistic context that ISL operates within is complex: while ISL is quite distinct from its nearest neighbouring sign language, British Sign Language (BSL), there are many influences from BSL on ISL. These provide ISL users with easy access to televised BSL programs, assist in the traditional migration of Irish Deaf people to the UK for post-secondary training and employment, and facilitate the co-operation of organizations of Deaf people in the UK and the Republic. There has also been a traditional gender variation in ISL arising from the strict segregation of deaf boys and girls in the schools for the Deaf. As a small country, Ireland did not (and still does not) have a large number of deaf schools: indeed, there is one major school for Deaf boys, St. Joseph's, and one for girls, St. Mary's. The gender variation that exists at lexical level has been described in a number of papers by Le Master and Dwyer (1991) and LeMaster (1999-2000, 2002). As we shall see, a question that arises is whether the simultaneous constructions we discuss show significant gender variation. However, we begin by defining for the purposes of this paper what we mean by the term *simultaneous construction*.

2. SIMULTANEOUS CONSTRUCTIONS IN SIGN LANGUAGES.

Morphological research has shown that sign languages exhibit both a temporal, sequential ordering and a spatial, simultaneous patterning (Miller 1994). Research has also shown that in a sign language, derivational and inflectional markers can be built into a sign via changes in the movement, orientation, location, or handshape parameters of a given sign. These are all considered to be morphological alterations. We also know that non-manual features play a particularly important role in relation to the simultaneous marking of certain syntactic structures in signed languages, for example, in marking questions, marking negation, and topicalisation in several sign languages (Liddell 1980, Baker-Shenk and Cokely 1980, Kyle and Woll 1985, Coerts 1994, Sutton-Spence and Woll 1999, O'Baoill and Matthews 2001).

Brennan (1994), concerned with basic word order in signed languages, makes the point that we cannot talk about SVO or SOV or VSO ordering if the verb and its arguments are expressed simultaneously within the production of a single sign. She considers the variety of simultaneous constructions that have been identified across a range of signed languages and asks, "How can we specify basic word order patterns in terms of linear sequencing if types of relationships may (even must) be expressed simultaneously rather than sequentially?" (Brennan 1994: 32).

She notes that the work of many authors written in the 1994 volume she edited seem to demonstrate that, somewhat as in phonology, both linear and non-linear patterning occur, with work on simultaneous structures demonstrating that we need to "examine sign languages in their

own terms, rather than through the filter of spoken languages” (Brennan 1994: 32). We agree with her that simultaneity in sign languages should be investigated in its own terms rather than by searching for equivalent structures in spoken languages.

One important fact is that sign language users have access to more than one major articulator, providing opportunity, for example, for the simultaneous articulation of more than one argument in a sign language utterance. Miller (1994) discusses the variety of manual simultaneity possible within signed languages, outlining the following as possible construction types that we might expect to find across sign languages:

- (i) Two hands producing two different lexical items simultaneously
- (ii) Preservation of one sign on one hand while the second hand articulates a series of other signs
- (iii) Production of the “topic” on one hand while the “comment” is articulated on the second hand
- (iv) Placing a sign articulated on the dominant hand on or in relation to an enumeration morpheme, which is expressed by the non-dominant hand (we might refer to this as a “listing” strategy).
- (v) One hand represents the locative position of one argument while the second hand represents the relative locative position of the second argument.

We can identify examples for each of these forms of simultaneous constructions in ISL. In doing so, we can also identify a range of functional/cognitive principles in operation.

3. SIMULTANEOUS CONSTRUCTIONS IN ISL.

In this section we will briefly introduce an ISL example of each of the types of simultaneous constructions identified by Miller before turning our focus specifically to simultaneous constructions where locative relations are established. We also consider what principles can be identified at a functional / cognitive level with respect to the data. It should be noted here that while these constructions have been referred to as “simultaneous” in nature, it is typical that one element is introduced prior to a second before any in-tandem articulation occurs.

3.1 A LEXICAL ITEM ON EACH HAND.

The first kind of simultaneous patterning identified by Miller involves the signer presenting one lexical item on one hand while introducing a second item on the other hand. An example of this can be seen in (1):

while the second hand articulates a series of other signs. In ISL, we can see an example of such an instance in (2):

- (2) r/s WINDOW 2/h f. +CL.S. +hi CL.B “PUSH-UP-WINDOW-WITH-NOSE CL. C. –
 CL. B
 “open”
 2/h CL.B. OPEN-WINDOW d. c.CL.V. CLIMB-OUT-UNDER f. c.+CL.G.+f
 nd. CL.B _____

“He (the bear) opened the window using his nose to push open the sash window-pane, and climbed out of the window and was on his way.”(Informant: female aged 25-35 years, deaf sibling/s: narrative, Leeson 2001).

In (2), c.+CL.V. CLIMB-OUT-UNDER+f. c.+CL.G.+f is articulated by the dominant hand, while the non-dominant hand “holds” the window open for the duration of articulation of the clause on the dominant hand. The non-dominant hand maintains the introduced inanimate referent, window, as it is held open by the bear (a zero motion activity), while the dominant hand articulates the motion activity of the animate entity, the bear. This division of least animate element articulated on non-dominant hand versus most animate element articulated on dominant hand is a theme we will return to again.

3.3 TOPIC ON ONE HAND, COMMENT ON THE OTHER.

Thirdly, Miller discusses the production of a “topic” on one hand while a “comment” is articulated on the second hand as another typical form of simultaneous signing. Topic marking does occur in ISL but may be more restricted than reported for other sign languages (Saeed, Sutton-Spence and Leeson 2000, Leeson 2001). Leeson (ibid) suggests a continuum of topicality, where the non-manual features marking topic and the kinds of topic that can occur in ISL vary according to a typicality scale. She also identified some seeming variation between the articulation of typical topic marking between male and female informants – something that will be explored in greater depth in ongoing research. For now, we can say that the typical non-manual topic markers that have been identified (head tilted back and brows raised to mark for topic, then a pause, then a head-nod before articulating the comment) are typically articulated by male signers. Female signers may mark onset of topic with raised brows, though the most frequent characteristic is the marking of the offset of topic with eye blink.

Saeed et al. (2000), who briefly considered a range of elicited examples of transitive utterances in ISL and BSL, found that the introduction of themes (or topics) were most likely to be found in locative sentences. Generally, they found that the least animate entity was introduced first, and a more animate entity second. An example of this can be seen in (3):

(3) HOUSE nd HOUSE _____

dh TREE (be-located-behind)

“The tree is behind the house”. (Informant: male aged 35-45 years, deaf parent/s, sibling/s, spouse, and children: picture elicitation data, sentence 1, Leeson 2001).

In (3), HOUSE is foregrounded (Talmy 1996) or topicalised (Lambrecht 1994), creating a referential point for further dialogue. The informant holds the sign for house with his non-dominant hand to maintain the referential status of the topicalized constituent. HOUSE is normally articulated with two hands, as in the initial sign. A one-handed version of the normally two-handed sign TREE also co-occurs with this segment. The signer articulates this with his dominant hand, thus indicating that this has assumed higher informational status (i.e., this is new information) than the preceding constituent, HOUSE.

3.4 LOCATIVE RELATIONS EXPRESSED SIMULTANEOUSLY.

Miller notes that a fourth type of simultaneous construction involves a situation where one hand may represent the locative position of one argument while the second hand represents the relative locative position of the second argument. This construction is illustrated in (4) and (5):

(4) FLOWER (2h) CL.C +extent (vase) FLOWER v.a.s.e.

nd. CL.C

d.CL.S (take-bunch-of-flowers-out-of-vase-and-place-at-right-of-vase)

“The flowers are beside the vase”. (Informant: male aged 35-45 years, deaf parents, sibling/s, spouse, and children: picture elicitation data, sentence 2, Leeson 2001).

(5) eyegaze down, watching doll fall
DOLL 2/h CL.B.(“small”) BROWN d. c.+CL.V.+f.lo. “fall-over-wall-to-below”
nd. CL.B.”wall” _____

eyegaze at left
CL.V.+f.+lo. r/s CL.B.(“feet”) {sniffs, moves item X with nose and opens mouth}

“The doll fell over the wall and down to the ground on the other side where it landed at the feet of (the bear). He sniffed (the doll) and took it in his mouth.” (Informant: male, aged 35-45 years, deaf spouse: narrative, Leeson 2001).

Example (4) is taken from a set of elicited locative sentences. The elicitation data replicates Volterra, Laudanna, Corazza, Radutsky, and Natale’s (1984) approach to identifying word order in transitive utterances in a Swiss Sign Language. This approach has been replicated by Boyes-Braem, Fournier, Rickli, Corazza, Franchi and Volterra for Italian Sign Language

(LIS) (1990), Coerts (1994) for Sign Language of the Netherlands (SLN) and Vermeerbergen for Flemish Sign Language, so it seems to be a good starting point for considering a comparison of strategies for encoding transitivity in BSL and ISL (Saeed et al. 2000).

Example (5) is an excerpt from the signed story, “The Bear.” Both (4) and (5) illustrate the relative locative relations of constituents: inanimate in (4), animate in (5). Example (4) illustrates the locative relations between a flower vase and a bunch of flowers. The signer establishes the locative relationship by establishing a locus in signing space for both constituents, relative to one another.

In (5), a verb of motion, c.+CL.V+f +lo. “fall-over-wall-to-space-below” is expressed on the dominant hand, while the non-dominant hand maintains the relative position of the starting point of the doll’s fall, the wall, in place. With eye-gaze down, following the path of the doll’s fall, the relative positions of where the doll’s fall commenced and its resting place in the bear’s enclosure are maintained, placing emphasis on the distance between locations.

Interestingly, it seems that while sign languages have the potential to establish locative contexts and use simultaneity to a great degree, some languages utilise this potential less than others. This seems to be the case with ISL vis-à-vis BSL, as reported by Saeed et al. (ibid.), a point which we shall return to later.

3.5 LISTING STRATEGIES.

The fifth typical form of simultaneous articulation identified by Miller involves the placing of a sign articulated on the dominant hand on or in relation to an enumeration morpheme, which is expressed by the non-dominant hand. We might refer to this as a “listing” strategy that functions as an episodic marker. This is found in several sign languages, though it seems to be a feature of more formal discourse (Ingram 2000 for American Sign Language (ASL)). In ISL, such listing strategies also occur, though, as can be seen in (6) and (7), this seems not to be a formal constraint in ISL insofar as signers are not “obliged” by the language to utilise a simultaneous listing strategy in order to be grammatically correct. As with other examples we have seen, signers have choices regarding how they frame their discourse.

(6) d HAVE HOT d.o.g. CHICKEN BURGERS HAVE
 nd FIRST _____ SECOND _____ THIRD
 “They have hotdogs, chicken, and burgers”. (Informant data: female informant aged 25-35 years, deaf siblings and partner: dialogue: The “*ABC of ISL*” footage, Leeson 2001).

(7) d IF ANYTHING CROP-UP CAN USE f.l.a.r.e.s o.r. e.p.i.r.b.
 nd SECOND _____

INDEX f.+hi. LINK WITH s.a.t.e.l.i.t.e. trace-with-index-finger-f.+hi.-to-s.l.+lo TO
 r.e.s.c.u.e. CENTRE

“If there is an emergency you can use flares or an E.P.I.R.B. This is linked by satellite to a rescue centre.”(Informant data: male aged 45-55 years, deaf sibling/s and spouse: *Hands On* footage, Leeson 2001).

(9) NOW EXPLAIN FOUR POINT VERY IMPORTANT/ HAVE IMPORTANT FOUR

“first one”

FINISH / ONE PRO-1 WANT REMIND YOU-ALL SIGN LANGUAGE ARE

REAL LANGUAGENUMBER TWO SIGN LANGUAGE ARE NOT

ENGLISH ^{neg} THAT NOT MEAN ISL HAVE POOR g.r.a.m.m.a.r OR

NOTHING g.r.a.m.m.a.r/ ISL HAVE RICH g.r.a.m.m.a.r. AND HAVE OWN

g.r.a.m.m.a.r. HAVE OWN WORD-ORDER

dh: AND

nd: MOVE-TO-NEXT-POINT

REMIND YOU-ALL ISL VERY DIFFERENT...../AND FOURTH

REMEMBER.....

“Now I’m going to outline four very important points, after which I will finish up here. First, I want to remind you that sign languages are real languages ... Second, sign languages are not just (manually delivered forms of) English. This does not mean that ISL then has a poorly developed grammar or that it has no grammar (system).(ISL) has a rich grammar system, it has its own grammar and has its own word-order. Moving on to the next point, I want to remind you that ISL is very different from Signed English ... and fourth, bear in mind that ” (Informant: female aged 25-35 years, deaf sibling/s and spouse: conference presentation: IDS footage, Leeson 2001).

In contrast with earlier examples, in (9) the signer could have used a simultaneous strategy for introducing each point in turn and then expounding on them, but she did not. However, in the second-to-last point she does use a simultaneous sign utterance: AND, signed on the dominant hand, is held, followed by MOVE-TO-NEXT-POINT, articulated on the non-dominant hand. It may be that the length of the commentary in relation to each point listed is a pragmatic factor that influences the decision to hold a list in place or to simply avoid simultaneous strategies, as is generally the case in (9).

4. LOCATIVE SENTENCES: SIMULTANAEITY AND FOREGROUNDING.

Leeson (2001) examined certain aspects of verbal valency in ISL as part of her doctoral work, including how certain types of transitive utterances pattern in the language. Data was drawn from a total of 27 Deaf informants using elicited, non-elicited, authentic and prepared data for the analysis. In considering locative constructions, which are described as sentences where two or more arguments whose relationships are determined by the relative positions of the arguments to one another, she found that the degree of use of simultaneous constructions was

striking, particularly with respect to other sentence types (reversible and non-reversible transitive utterances).

There also seems to be a difference between how consistently native signers (i.e., those from a Deaf family) use simultaneous constructions to represent locative relations versus those who are fluent users of ISL, but who do not have Deaf parents or siblings. Indeed, of the six signers who participated in a preliminary transitive utterance elicitation task, the signer with Deaf parents used simultaneous constructions in all six utterances where locative relations were expressed; the two signers who had Deaf siblings used simultaneous constructions in four of the six utterances they each produced, while one of the remaining informants chose to use a locative construction only in one instance. This pattern was repeated for other sentence types too, with the native signer choosing simultaneous constructions over non-simultaneous constructions much more consistently than other informants. These findings were replicated in the non-elicited data. One example illustrating this is (10):

- (10)
- | | | | |
|---------------|-----------|--------|--------------------------------|
| INDEX-TO-LEFT | d: | WINDOW | “have” |
| | nd: CL.B. | | CL.G+trace-arc CL.B.+trace-arc |
| | | | HAVE CL.B.+palm upwards_____ |

2/h CL.5+”tiny-entities-moving-in-a-non-linear-pattern-at-c. (location of GLOBE)/

“fall”

TWO BEAR d: **BIG SMALL** sl+CL.V.+sl+lo –“falls-from-window”
 nd: INDEX-TO-LEFT

“(Beside their bed) there was a window, and on the window sill there was a snow globe, which contained two bears, one big and one small. Suddenly, it fell from the window sill ... ”
 (Informant: female aged 25-35 years, deaf sibling/s: narrative, Leeson 2001).

Example (10) is an excerpt from “The Bear” provided by another signer. In this example, the signer establishes a topographical spatial context for the events, insofar as she locates the position of the windowsill relative to the already established position for the bed where the little girl and the white bear lie asleep. From this point on, the signer introduces a new referent: the snow globe that contains two bears. She first establishes the ground, with her non-dominant hand articulating a CL.B. handshape representing the base of the snow globe, while with her dominant hand she traces the outline of the extent of the snow globe dome. Having established the relative dimensions of the snow globe, the signer specifies what this object is, signing “2h CL.5+”tiny-entities-moving-in-a-non-linear-pattern-at-c. (location of GLOBE) which is representative of the motion and path of the “snow” falling in a snow globe. (The productive lexicon is used here as ISL typically seems to express novel concepts using complex forms where no established lexical item exists.) Having established the ground, the signer then introduces the figure: the two bears who are situated within the snow globe. Another example where a simultaneous construction is used to represent the relative position of entities is (11):

- (11) 2h: CL.G.+c. d: CL.G+”start-to-overtake”-nd/h. (fingers-wiggle)
 nd: CL.G.+c. _____

_____ eyebrows raised +”ee”
 d: stalls+pulls-back-to-original-position+c.
 nd. _____

“Then one cyclist went to overtake another, thought better of it and withdrew to their original position.”(Informant: male aged 25-35 years, deaf sibling/s: *Horizon* footage, Leeson 2001).

In (11), the signer establishes the relative positions of two cyclists to one another through use of a simultaneous sign, then uses that relative positioning to express the verb phrase that we have translated as “one cyclist went to overtake another”. In this phrase, the dominant hand represents an Actor-Verb element and the non-dominant hand an Undergoer element. Again, we can note that the structure of the simultaneous construction leads to the non-dominant hand representing the less active (though animate) element and the dominant hand representing the most active (animate) element.

We might describe the two cyclists, introduced through the use of classifier-predicate functions (CL.G.), as a Theme, which we can describe as an entity moved by an action or whose location is described. Here, both “cyclists” (expressed through a simultaneous construction) are introduced in discourse simultaneously and seem to be introduced to establish the relative locative positions of both signers. Having introduced the referents in a non-explicit way (i.e., the signer did not name the cyclists or even make reference to the fact that he was introducing two specific cyclists, intending that this information be derivable from the discourse topic), the signer backgrounds the cyclist who remains in position by maintaining their locative position with the non-dominant hand while foregrounding the cyclist who attempts to overtake his co-cyclist through use of the dominant hand. Adopting Talmy’s (1985) terminology, we can also describe the cyclists represented on the dominant and non-dominant hands as “Figures”, where Figure is an entity that is moving or stationary with respect to the “Ground”, in this case, the route that the cyclists are following, which is attentionally gapped. The fact that we can identify thematic/semantic roles along with attentional notions of Figure/Ground in examples such as this demonstrates that the Figure/Ground distinction can be laid over two Themes, and that this kind of mapping can occur as well as expected pairings of Themes and Locations.

Leeson (2001) noted that ISL signers seem to establish contexts at the outset of locative utterances much more frequently than they do in reversible or non-reversible types. That is, they establish the discourse scene, introducing the major players early on, and the existence of relevant entities in the discourse “environment”. For example, the location of a TV set and the relative location of the sofa may be introduced before a signer talks about the activity of watching TV; a story about a walk in the woods may be preceded by a description of the woods, the density of the overgrowth and the state of the path; etc. In the non-elicited data, we found that signers introduced more contextual information relative to the story line throughout discourse rather than as an established discourse topic per se. Other examples of locative utterances in the non-elicited data where Themes are used to introduce the relative location of one or other referents that follow in a simultaneous construction are illustrated in (12) and (13):

- (12) CL.B.-vehicle IN p.**r. STREET

d: **CAR CL.B. “vehicle”+be-located+sr _____**
 nd: **GIRL MAN**

d: _____
 nd: **CL.-Legs+trace-arc+sl+move-to+c.**

“A car was coming up P*** Street when a person walked out (onto the street).”
 (Informant: female aged 45-55 years, deaf sibling/s and spouse: *Horizon* footage,
 Leeson 2001).

- (13) CL.C.+c. (hold-onto-wall)

DOLL 2/h CL.B. (“small”) BROWN

d: CL.Legs.+f+lo (fall-over-wall-to-space-below) CL.V.+f+lo
nd: CL.B.(“wall”)...

“(They) had a small brown doll and as (they) held onto the wall, the doll fell over the
 wall and down to the ground on the other side where it landed at (the feet of the
 bear).” (Informant: male aged 35-45 years, deaf spouse: narrative, Leeson 2001).

In (12), the signer introduces the constituents CAR and GIRL MAN (“person”) before assigning them to loci in signing space that expresses their relative location to one another. An interesting point here is the fact that the non-dominant hand represents the activities of the most animate element, the person who is knocked down, while the less animate entity, the car, is articulated on the dominant hand. However, in the extended discourse, it becomes clear that the driver of the car is the focus of the narrative: he is the narrator’s husband. Thus, we can also suggest that the foregrounding of a discourse topic may take precedence over a clausal Theme.

Finally, in (13), the signer introduces the constituent DOLL as the Theme before articulating a classifier-predicate verb phrase that traces the path of the doll’s fall from one side of the wall down into the bear’s enclosure. Interestingly, all these examples demonstrate again the general attentional pattern of a signer introducing the Ground element and then a Figure element.

We can note that the use of Themes seems typical in the establishment of locative utterances and seems to be typically associated with the introduction of the Actor who acts in the following clause. We can also note that it seems typical for ISL locative utterances to hold to the macro-role pattern of Theme as an extra clausal element that introduces a constituent followed by an implied Actor². The frequency of such patterning with respect to the establishment of focus patterns in simultaneous constructions in ISL is one that we suggest requires further investigation. For now, we can suggest that there does seem to be a continuum of topicality in operation in ISL, where the data considered here can be accounted for by the observation that if an element introduced as a Theme is high in motion, animacy, etc., then it is likely to appear as an Actor/Theme in successive clauses.

² We draw on Van Valin and La Polla’s (1997) discussion of macro-roles to capture the generalizations of thematic themes. They introduce Actor as the most Agent-like element in a clause and Undergoer as the most Patient-like element in a clause.

5. SIMULTANEOUS CONSTRUCTIONS AND REVERSIBLE SENTENCES.

Finally, we also found evidence that signers used simultaneous constructions in establishing the relative locative positions of constituents vis-à-vis each other in some reversible sentences. We differentiate these from locative utterances insofar as the underlying motive for the reversible utterance was the establishment of a motion event that occurs between two constituents rather than the relative positions of the constituents with respect to one another as seems to be a defining characteristic of the locative utterances. We follow Boyes-Braem et al. (1990) in describing reversible sentences as sentences where the major constituent roles could be reversed.

Again, we draw the reader's attention to the fact that we use the term *simultaneous construction* account for the fact that information regarding two arguments is presented at the same time. However, typically one argument is introduced prior to the second. For example, in (14), the segment CURL-UP-WITH was articulated prior to the information articulated on the dominant hand. Indeed, the non-dominant hand is serving to background the fact that both the bear and the girl are curled up in bed while foregrounding the activity of the bear with respect to that background. In this instance, the animate element, the bear, is foregrounded vis-à-vis another animate entity, the girl. But here, the activity of the bear are focal and are represented on the dominant hand.

- (14) d: ____CL.B. "turns-head" CL.B. "moves-paw"
 nd: CURL-UP-WITH_____

"(And the bear) who was curled up in bed (with the little girl) turned to see what happened" (Informant: female aged 25-35 years, deaf sibling/s: narrative, Leeson 2001).

Example (15) is another example of a simultaneous construction, though in this instance, there seems to be shared focus on the state of zero-motion of both the bear and the girl as they sleep:

- (15) d: CL.Legs ("to lie")
 nd: CL. Legs ("to lie") "SIDE-BY-SIDE"
 "(The girl and the white bear slept) curled up together, lying side by side." (Informant: female aged 25-35 years, deaf sibling/s: narrative, Leeson 2001).

In both (14) and (15), the relative positioning of the constituents is established as a context-planning device that is utilised later in the narrative. Also, it might be a little misleading to suggest that this kind of structure is normative in the data as far as reversible sentences are concerned. These were two of a very limited number of borderline examples in the entire transcribed corpus that was considered. In extended narratives, it seems that ISL signers prefer to use other strategies, namely straightforward naming of constituents in Actor Verb Undergoer sequences, the introduction of constituents through Themes, or they may choose to use reference shifting (or "role-shifting") strategies in articulating reversible sentences.

Interestingly, Leeson (ibid.) reports that signers may prefer to use reference shifting rather than the use of simultaneous constructions in extended narratives even though use of a

simultaneous construction would be equally possible in many circumstances. Example (16) shows a signer use reference-shifting strategies to move between already established loci for a man who rents bicycles and a group of young people who want to hire bicycles. The diacritic “r/s” refers to a reference shift. Here we see the signer move between the locus for the man before moving toward the point in signing space that has been established as co-referential with the young people. At this locus, the signer uses the CL.5+open handshape in a complex predicate verbal construction to indicate that the group followed the man to his shop. The diacritic “2/h” refers to the fact that both of the signer’s hands are used in the articulation of the complex predicate construction.

(16) eyegaze to left _____ th
 r/s COME-ON 2/h CL.O –“hold-sign-aloft”

_____th
 HANDY MAYBE MORE PROFIT HANDY

2/h CL.5+open +f+s+l+f

“He beckoned us on. (Perhaps he thought) ‘that’s handy - a quick profit can be made’. Our group snaked behind him (to his shop).” (Informant: male aged 25-35 years, deaf sibling/s: *Horizon* footage, narrative, Leeson 2001).

An alternative strategy could have included use of a simultaneous construction where the man was represented at his locus by a CL.G. handshape, and the group was represented by a CL.5-open handshape, both of which moved in tandem toward the locus for the implied bicycle shop. It may be that the signer did not choose this strategy because he wanted to assign focus to the interplay between the characters: the greed of the shopkeeper on the one hand is reinforced through use of reference shifting strategies that allow us to ponder what he might have been thinking about the amount of interest in his bikes. This contrasts with the readiness of a large group that is ready to move enmasse in the direction of the bike shop.

Thus it may be that the choice of structure that an ISL signer chooses to use may be pragmatically influenced by the discourse focus. That aside, it does seem that ISL signers prefer to construct reversible sentences using the macro-role patterns of Theme (Actor) Verb (Undergoer) in sequences where agreement verbs, particularly classifier constructions, will be introduced, or Actor Verb Undergoer in situations where plain verbs will be used. This contrasts with findings for locative utterances where simultaneous constructions most commonly occur.

6. SIMULTANEOUS CONSTRUCTIONS: WHAT MOTIVATES THEIR USE?

We noted earlier that ISL seems to make less use of simultaneous constructions across transitive utterances than BSL (Saeed et al. 2000). The question that then arises is why this might be the case. If all sign languages have the option of maximizing the potential of a three-dimensional signing space, with the possibility of locating referents in this space in simultaneous or semi-simultaneous patterning, then why would some sign languages or some groups of signers within one language do so less than others?

In ISL, we can identify two important factors: educational practices and the relationship with BSL. The strict segregation of boys and girls in the schools for the Deaf, coupled with the

more entrenched oral dogma that prevailed in the girls school might partly account for why men might use simultaneous constructions more than women: Le Master and Dwyer (1991) and Le Master (2002) both discussed the impact of this segregation on the lexical differences that are gender-specific in ISL, but no one has considered the fact that these gender-specific differences may be more entrenched. The possibility of gender-specific grammaticalization paths beyond the level of the lexicon is something that must be considered, and we thank Dr. Terry Janzen for bringing this to our attention.

Another factor is the historically low prestige of ISL and the influence of BSL as a contact language. For example, until the mid 1980s, no self-advocacy organization of Deaf people existed in Ireland. Before this time no one in Ireland referred explicitly to the signed language they were using as an indigenous language, and there was no place for the formal teaching of ISL in educational domains as there are today. The use of a signed language was stigmatized, and Signed English (or variants thereof) was considered a prestige variety, with all the co-occurring affective issues that go with that (for example, ISL was considered by many to be a low variety of signed language commensurate with low intelligence and low academic achievement-levels). Until 1992, there were no opportunities for Deaf people to train as ISL tutors or to study the linguistics of ISL. Having had contact with BSL communities through exchange programmes between the Centre for Language and Communication Studies at Trinity College, Dublin, and the Centre for Deaf Studies at Bristol University, ISL users were influenced by the range of uses of BSL, a language with a community that was politicized much earlier than the Irish Deaf Community. Elements of BSL seeped into the language use of Deaf people who went to the UK for study purposes, and they brought these usages home with them. Other Deaf people identified them as making greater use of signing space, including simultaneous signing strategies, which led them to suggest they were “using BSL,” although the vocabulary they used was clearly ISL. As these trained tutors also became linguists, conducting research and being identified by the Deaf community as experts, their use of ISL became, to a certain degree, prestige forms. So, language contact has clearly played a role too in the more widespread use of simultaneous constructions. Beyond the use of ISL as used by those people who undertook university training, we also find that as the status of ISL increases, more Deaf people seem to utilize “typical” sign language structures. A comparison of the increased frequency of use of simultaneous constructions in formal contexts can be borne out by comparing an Irish Deaf Society Congress in the mid 1980s with most recent conferences organized by Deaf people.

We think that there are idiosyncratic issues involved too: we cannot overlook or forget that signers have choices. As we have seen, they can choose to place focus on one element in isolation while gapping certain information. They can establish a chronological relationship between one element and the next, and, like speakers of any language, place greater focus on one element than on others. But unlike speakers of a language, signers get to do this in a unique manner through simultaneous signing strategies. The outcome seems to be that information that could be gapped in discourse is maintained though often backgrounded. This is in line with the following reflection by Talmy (1996): *Language affords the speaker alternatives of attentional windowing upon essentially the same event frame, with the addressee feasibly able to infer the different gapped portions for each alternative so as to reconstruct back to the same single event frame* (1996: 260).

But many questions remain: What might the use of simultaneous constructions tell us about sign languages generally and cognition particularly? Clearly, we can say that signers are choosing to represent their view of an event in a certain way, maintaining some degree of focus

on backgrounded data. The interesting thing is that while all signers have these choices open to them, certain sign languages seem to encode this possibility more widely. This is a point that demands further consideration.

We can also ask whether certain groups of signers use simultaneous constructions more than others? Leeson (2001) suggests that native signers and male informants use simultaneous constructions more frequently than female signers. Janzen (2002: personal communication) has suggested that a gender-specific course of grammaticalization may be identifiable. We must also consider, then, how frequently younger signers use such structures and for what purposes. Clearly there are also a great deal of sociolinguistically relevant questions to consider in addressing simultaneous constructions in ISL.

7. ACCOUNTING FOR PATTERNS.

While we do not have all the answers, we can suggest a general principle for the expression of simultaneity in ISL: the dominant hand marks foregrounded material while the non-dominant hand marks backgrounded material. That is, the choice is based on principles of the windowing of attention. Because of the correlation between attention and notions of motion/activity, animacy, etc., this general principle has several corollaries, including, the dominant hand marks the most animate element while the non-dominant hand marks a less animate element; the dominant hand marks the most active element while the non-dominant hand represents a less active/moving element.

A second general principle is iconicity: choice of what is represented on the dominant and non-dominant hands may be dictated by the actual positioning of entities in the real world, modeled in topographical signing space.

8. CONCLUSIONS.

In this paper, we have noted that simultaneous constructions are an interesting range of structures in sign languages that seem to be motivated in part by the potential to use space to represent space. We noted that while all sign languages have the same potential to draw on and encode structured means of manipulating the fact that signers have two major articulators, the arms, available to them, some sign languages draw on this potential more than others. We drew on the small-scale comparison of elicited data for BSL and ISL in considering this point (Saeed et al. 2000).

In considering simultaneous constructions in ISL, we noted that they are most widespread in the establishment of locative relations, though they are used in other transitive utterances too. In terms of reversible utterances, we noted that simultaneous constructions are simply one option available to signers: they could equally choose to reference shift to demonstrate point of view. Instead, it seems that simultaneous constructions are about focusing attention on the activities of one entity with respect to another. We identified a tentative outline of the characteristics of prototypical simultaneous constructions in ISL, though we noted that this would need some refining with respect to ongoing research that considers the role of gender and generation in the use of these structures. Tentatively, we can note that the features foregrounded, animacy and activity, typically map with articulation on the dominant hand while the features backgrounded, inanimacy and inactivity map with articulation on the non-dominant hand. Naturally, sliding

scales operate, and pragmatics may affect signer choice regarding what is articulated on which hand. Nonetheless, we argue that these findings suggest that simultaneous structures demand further consideration by linguists generally as they seem to offer us a clearer view of how focusing strategies operate in visual-gestural languages.

REFERENCES

- Baker-Shenk, C. and Cokely, D. 1980. *American Sign Language: A Teacher's Resource Text on Grammar and Culture*. Washington D.C.: Gallaudet University Press.
- Boyes-Braem, P., Fournier, M., Rickli F., Corazza, S., Franchi, M. and Volterra, V. 1990. A Comparison of Techniques for Expressing Semantic Roles and Locative Relations in Two Different Sign Languages. In Edmondson, W. and Karlsson, F. (eds.): *SLR 87: Papers from the Fourth International Symposium on Sign Language Research*. Hamburg: Signum Verlag. 114-120.
- Brennan, M. 1994. Word Order: Introducing the Issues. In Brennan, M. and Turner, G.H. (eds.): *Word Order Issues in Sign Language. Working Papers*. Durham: International Sign Linguistics Association. 9-46.
- Burns, S. 1997. Irish Sign Language: Ireland's Second Minority Language. *Vision's '97*. Washington DC: Department of ASL, Linguistics and Interpretation, Gallaudet University.
- Coerts, J. 1994. Constituent Order in Sign Language of the Netherlands. In Brennan, M. and Turner, G.H. (eds.): *Word Order Issues in Sign Language. Working Papers*. Durham: International Sign Linguistics Association. 47-72.
- Givón, T. 1988. The Pragmatics of Word-Order: Predictability, Importance and Attention. In Hammond, M. et al. (eds.): *Studies in Syntactic Typology*. TSL 18. Amsterdam: John Benjamins.
- Janzen, T. 2002. *Perspective Shift Reflected in the Signer's Use of Space*. Unpublished paper presented at the University of Dublin, Trinity College, Centre for Deaf Studies Open Lecture, 14 October 2002.
- Kyle, JG and Woll, B. 1985. *Sign Language: The Study of Deaf People and their Language*. Cambridge: Cambridge University Press.
- Lambrecht, K. 1994. *Information Structure and Sentence Form: Topic, Focus and the Mental Representations of Discourse Referents*. Cambridge: Cambridge University Press.
- Liddell, S.K. and Metzger, M. 1998. Gesture in Sign Language Discourse. *Journal of Pragmatics* 30, 657-697.
- Leeson, L. 2001. *Aspects of Verbal Valency in Irish Sign Language*. Unpublished Doctoral Dissertation. Centre for Language and Communication Studies (CLCS). University of Dublin, Trinity College.
- Le Master, B. 1999-2000. Reappropriation of Gendered Irish Sign Language in One Family. *Visual Anthropology Review* 15, Number 2. Fall-Winter 1999-2000. 1-15.
- Le Master, B. and Dwyer, J.P. 1991. Knowing and Using Female and Male Signs in Dublin. *Sign Language Studies* 73, 361-396.
- Le Master, B. 2002. What Difference does Difference Make? Negotiating Gender and

- Generation in Irish Sign Language. In Benor, S., Rose, M., Sharma, D., Sweetland, J. and Zhang, Q. (eds.) *Gendered Practices in Language*. CSLI Publications.
- Matthews, P.A. 1996. *The Irish Deaf Community*, Volume 1. Dublin: ITE.
- McDonnell, P. 1996. *Verb Categories in Irish Sign Language*. Unpublished doctoral dissertation. Centre for Language and Communication Studies, University of Dublin, Trinity College.
- Miller, C. 1994. Simultaneous Constructions in Quebec Sign Language. In Brennan, M. and Turner, G.H. (eds.): *Word Order Issues in Sign Language. Working Papers*. Durham: International Sign Linguistics Association.89-112.
- O'Baoill, D. and Matthews, P.A. 2001. *The Irish Deaf Community, Volume 2: The Linguistics of Irish Sign Language*. Dublin: ITE.
- Saeed, J.I., Sutton-Spence, R. and Leeson, L. 2000. *Constituent Order in Irish Sign Language and British Sign Language: A Preliminary Examination*. Poster presented at TISLR 7, Amsterdam, 23-27 July 2000.
- Sutton-Spence, R. and Woll, B. 1999. *The Linguistics of British Sign Language: An Introduction*. Cambridge University Press.
- Talmy, L. 1996. The Windowing of Attention in Language. In Shibatani, M. and Thompson, S.A. (eds): *Grammatical Constructions: Their Form and Meaning*. Oxford: Clarendon Press.
- Van Valin, R. D. Jr. and Foley 1980. Role and Reference Grammar. In Moravcsik, E.A. and Wirth, J.R. (eds): *Syntax and Semantics. Volume XIII: Current Approaches to Syntax*. New York: Academic Press. 329-52.
- Van Valin, R. and La Polla, R. 1997. *Syntax: Structure, Meaning and Function*. Cambridge University Press.
- Vermeerbergen, M. 1996. *Rood Kool Tien Persoon In: Morfo-syntactische Aspecten van Gebarentaal*. Unpublished Ph.D. Dissertation. Free University of Brussels: Brussels, Belgium.
- Vermeerbergen, M. 1998. *Word Order Issues in Sign Language Research: A Contribution from the Study of Flemish-Belgian Sign Language*. Paper Presented at the Sixth International Conference on Theoretical Issues in Sign Language Research, Washington D.C., November 12-15, 1998.
- Volterra, V., Laudanna A., Corazza S., Radutsky, E. and Natale, F. 1984. Italian Sign Language: The Order of Elements in the Declarative Sentence. In F. Loncke, Boyes-Braem, P. and Lebrun, Y. (eds.): *Recent Research on European Sign Language*. Lisse: Swets and Zeitlinger. 19-48.

THE JOY OF TAWAHKA: AN OVERVIEW OF SOME ASPECTS OF THE PHONOLOGY, MORPHOLOGY, AND SYNTAX OF A MISUMALPAN LANGUAGE*

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1. INTRODUCTION.

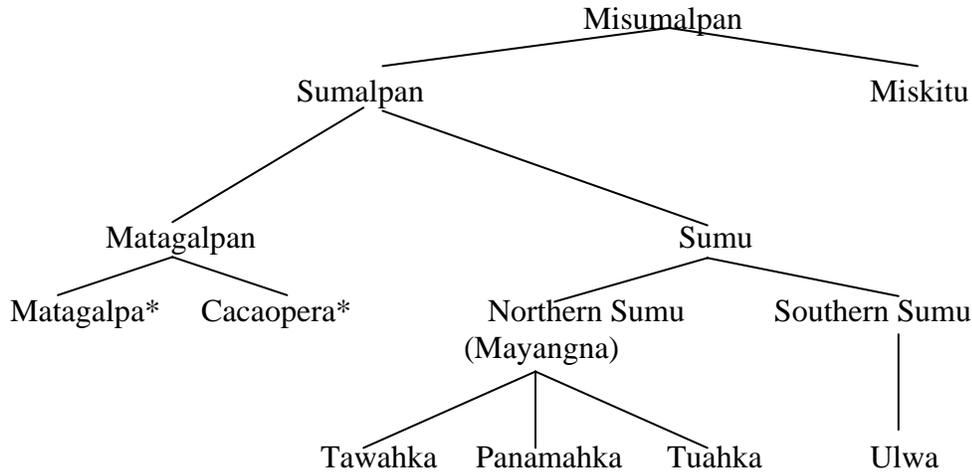
Central America is extremely interesting and complicated from a cultural and linguistic point of view. Guatemala and Belize, in the north, form the southern boundary of the Mesoamerican culture area; Panama and to some extent Costa Rica, in the south, form the northern boundary of the northern South American culture area. Honduras, El Salvador, and Nicaragua form a culture area of their own, with influences from both the Mesoamerican area and the South American area. In terms of language families, the Mesoamerican area, to the north, is dominated by Mayan languages, and the South American area is characterized by Chibchan languages. In between are found (or have been found historically) the small families of Xincan, Lencan, and Misumalpan. Various hypotheses as to the genetic relationships of these languages have been presented (for example, Ruhlen 1987 [1991], following Greenberg, lists all of them as members of a “Chibchan-Paezan stock”); however, Campbell (1997) states that there is no evidence for linking Xincan and Lencan, which are now extinct, with any other family, and that Misumalpan languages may be somehow related to Chibchan. The Misumalpan language family is shown in Figure 1. Cacaopera and Matagalpa are extinct, while Miskitu and the Sumu languages have approximately 100,000 speakers combined (Benedicto & Hale 2000).

Miskitu is by far the most vital of these languages: it has about eighty thousand speakers and is currently expanding through bilingualism into the Sumu areas. Northern Sumu (Mayangna) has about ten thousand speakers, and Ulwa, the sole representative of Southern Sumu, has fewer than a thousand (Benedicto & Hale 2000). Tawahka is one of the dialects of Northern Sumu, spoken by about six hundred people in northeastern Honduras; speakers of the other dialects, Panamahka and Tuahka, live in the same ecozone in Nicaragua. Virtually all speakers of Sumu languages are also speakers of Miskitu, and many also speak Spanish, English, or both.

Ken Hale and Danilo Salamanca (2002: 35) remark that “long-term bilingualism is part and parcel of a linguistic development which has resulted in a degree of structural isomorphism which permits us to say, setting certain details aside, that the three modern Misumalpan languages ‘share the same grammar.’” Furthermore, “[t]ranslation between the . . . languages is entirely straightforward, involving simple substitution of lexical items and affixes, with minor exceptions, of course. From the point of view of syntax, the languages are typologically identical” (Hale 1994: 264). As Dixon (1997: 20) points out, “[t]he ways in which a grammar is organised (but not the forms themselves) will always tend to be accommodated towards grammars of other languages of which some speakers have an active knowledge”; and Hale (1991: 1) notes, “[w]hatever the true relationship between Miskitu and Sumu proves ultimately

*I would like to thank the technical staff of PEBIT (Proyecto de Educación Bilingüe Intercultural de la Etnia Tawahka), Tegucigalpa, Honduras, for their unrelenting cheerfulness and willingness to share their years of experience; the fourteen Tawahka student teachers without whose linguistic knowledge my work could not have taken place; and the Fulbright Foundation for Fulbright 2001-2002 Lecturing/Research Award #1560.

to be, they have been spoken together for a very long time.” Thus, what I have to say about the grammar of Tawahka applies almost in its entirety to the grammars of Miskitu and Ulwa as well.



* Extinct

FIGURE 1: THE MISUMALPAN LANGUAGE FAMILY. (adapted from Hale & Salamanca 2002: 34)

2. PHONOLOGY.

All Misumalpan languages share the same phonology; they differ only in that the phonotactics of Miskitu is more complex than that of the Sumu languages, allowing more consonant combinations in the onset of a syllable. The Misumalpan consonants and vowels are shown in Tables 1 and 2, respectively.

	Bilabial	Dental	Alveolar	Palatal	Velar	Glottal
Stops	p b	t d			k	
Fricatives			s			h
Nasals	m̥ m	n̥ n			ŋ ŋ	
Lateral		l̥ l				
Tap/Trill			r̥ r			
Approximant	w			y		

TABLE 1: MISUMALPAN CONSONANTS. (based in part on Ocampo et al. 1998)

	Front	Central	Back
High	i i:		u u:
Low		a a:	

TABLE 2: MISUMALPAN VOWELS. (based on Ocampo et al. 1998)

All stop consonants are plain. One interesting aspect of the consonants is that the nasals, the laterals, and the tap/trills occur both voiced and voiceless, resulting in an unusually general pattern of consonant pairs. As for the vowels, each can vary notably in height, with /i/ being realized sometimes as [e], /a/ as [æ], and /u/ as [o], depending on the phonetic context. Spanish-speaking missionaries and others, in fact, often recorded words with <e> and <o>, not realizing that these were allophones of the front and back vowels. Vowel length is phonemic, distinguishing such pairs as orthographic *tun* ‘head’ and *tûn* ‘(his/her) tongue.’ It is interesting to note that in a survey of the phonological systems of 317 languages (selected to represent a wide selection of language families), Maddieson (1984: 129) found, “no language with 3 vowel qualities includes length.” The Misumalpan languages were not in his sample.

Additionally, while all six possible vowel combinations are found as diphthongs, /ai/ and /au/ are the most common in Panamahka (Norwood 1997: 11) and undoubtedly also in Tawahka. In common unstressed words in connected speech, these are often manifested in open syllables as [e:] and [o:], as shown in (1).¹

- (1) Tawahka Open Syllables
- a. *Yang bins dahtayang dai.* ([de:]).
I was planting beans.
 - b. *Tawahka ûnina balna kidi ahtak kau* ([ko:]) *papakwi.*
The Tawahkas make their houses out of *suita* fronds.

The eventual differentiation of these pronunciations from the diphthongal realizations could lead to the establishment of a 5-vowel system.

3. SYLLABLE STRUCTURE.

Most syllables in Tawahka are of the form (C)V(V)(C); there are a few words (probably fewer than twenty) with two-consonant onsets, but they appear to be loans from Miskitu (many ultimately from English).

Syllable weight plays an important role in several morphological processes in Tawahka. According to Benedicto and Hale (2000: 82):

[t]he unit that seems to be underlyingly responsible for the phenomena described in this section [morphological processes], as well as for stress patterns in the language, is the [iambic] prosodic foot . . . a prosodic unit formed by two moras (or weight units), the second one of which is the prominent one. Thus, such foot [*sic*] can be realized (in Mayangna) either as a single (initial) heavy syllable . . . or as two syllables, the first one of which is light while the second one may be light or heavy”

Perhaps there is reason to specify the prosodic foot as the relevant theoretical unit here, but I see no reason not to state simply that the morphological phenomena discussed below depend on a sequence of two moras, whether or not they occur in the same syllable.

A syllable-onset consonant carries no mora (Kenstowicz 1994: 428), a short vowel carries one, a long vowel or diphthong carries two, and a syllable-final consonant carries one

¹ Examples here and elsewhere come from my own fieldwork and from the unpublished Tawahka-Spanish-Miskitu dictionary, PEBIT, in process.

(Kenstowicz 1994: 428-436). Syllables bearing one mora are referred to as “light”; those bearing two are referred to as “heavy.”

4. MORPHOLOGY.

Affixation is common in Tawahka, as is reduplication in adjectives and verbs. While there are some derivational prefixes, and verbal affixes are suffixed to the stem, many affixes are added after two root moras. Affixation and reduplication in Tawahka are described in the following sections.

4.1 AFFIXATION.

Affixation is used in Tawahka to form the possessive of nouns and the “construct” form, which is identical to the third-person possessive. An affix is applied after the syllable of the noun in which the second of two moras occurs (the first syllable, if it is heavy, the second, if the first syllable is light). This process is shown in (2a-e).²

- | | | |
|-----|--|---------------------------------------|
| (2) | Tawahka Affixation for Possessive Noun Formation | |
| a. | <i>ambata</i> ‘ear of corn’ | <i>am-ki-bata</i> ‘my ear of corn’ |
| b. | <i>sana</i> ‘deer’ | <i>sana-m</i> ‘your deer’ |
| c. | <i>alasma</i> ‘party’ | <i>alasma-nina-na</i> ‘their party’ |
| d. | <i>û</i> ‘house’ | <i>û-kina</i> ‘our (exclusive) house’ |
| e. | <i>al</i> ‘man, husband’ | <i>al-ni</i> ‘her husband’ |

In (2a), the possessive affix *-k(i)-* is added after the first syllable, because the first syllable is heavy. In (2b), the possessive affix is added after the second syllable, which is light, because the first syllable is light as well. In (2c), the possessive affix is added after the second syllable, which is heavy, because the first syllable is light. In (2d) and (2e), the affix is suffixed, because these nouns are monosyllabic.

4.2 REDUPLICATION.

In Tawahka, the syllable affected is that in which the total of two moras is first reached in the word. Reduplication occurs in a few noun plurals, in the plural of many adjectives, and in the third-person plural forms of verbs.

4.2.1 NOUN PLURALS.

All but four nouns in Tawahka form their plurals through the independent word *balna*, which follows the noun, as shown in (3a). The words for ‘man,’ ‘woman,’ ‘young man,’ and ‘young woman,’ however, form their plurals through reduplication, as shown in (3b-e):

² All forms cited in standard orthography.

- (3) Tawahka Noun Plural Formation
- | | | |
|----|----------------------------|---------------------------------|
| a. | <i>walabis</i> ‘child,’ | <i>walabis balna</i> ‘children’ |
| b. | <i>al</i> ‘man,’ ‘husband’ | <i>ahal</i> ‘men’, ‘husbands’ |
| c. | <i>yal</i> ‘woman’, ‘wife’ | <i>yayal</i> ‘women’, ‘wives’ |
| d. | <i>wahma</i> ‘young man’ | <i>wawahma</i> ‘young men’ |
| e. | <i>sirau</i> ‘young woman’ | <i>sirarau</i> ‘young woman’ |

In (3b-e), the reduplication affects the syllable containing the second mora. The initial consonant of that syllable (if there is one) and the following vowel are duplicated and inserted before the affected syllable. This new syllable is always monomoraic, so that if the syllable containing the second mora has a long vowel or diphthong as its nucleus, only a short vowel or the first member of the diphthong is copied. In addition, if the syllable does not have an onset consonant, an /h/ is inserted between the new and the affected syllables. Thus, in (3b) above, an /h/ is added between the duplicated /a/ and the original /a/ of the singular. In (3c) and (3d), the first syllable is reduplicated; in (3c) because there is no alternative, and in (3d) because it is heavy. In (3e), on the other hand, the second syllable is reduplicated, since the first syllable is light.

4.2.2 ADJECTIVE PLURALS.

Adjectives often agree in number with the nouns they modify, although marking plurality in Tawahka is only obligatory in the verb. Thus, a noun phrase can be inferred to be plural simply because it is the subject of a plural verb; a plural noun can be modified by a singular adjective, or both noun and adjective may be marked. Precisely the same process used to form the four special noun plurals occurs in the formation of the plurals of most adjectives, as shown in (4a-c):

- (4) Tawahka Adjective Plural Formation
- | | | |
|----|--------------------------------|---------------------------------------|
| a. | <i>parahni</i> ‘short’ | <i>pararahni</i> ‘short’ (pl) |
| b. | <i>salani</i> ‘fat’ | <i>salalani</i> ‘fat’ (pl) |
| c. | <i>bîni</i> ‘small (quantity)’ | <i>bibîni</i> ‘small’ (quantity) (pl) |

4.2.3 THIRD-PERSON-PLURAL FORMS OF VERBS.

In Tawahka, the process of forming the third-person plural of most verbs is accomplished by the same reduplication process described for noun and adjective plurals, as shown in (5a-c). The process is modified only by the presence of prefixes in some forms. These prefixes do not take part in the mora count, so that the reduplicated syllable occurs farther to the right than would otherwise be expected, as shown in (6a-b).

(5) Unprefixed Verb Third-Person Plural Formation

- | | | |
|----|-----------------------|---|
| a. | <i>uk-</i> (root) | <i>uknin</i> , ‘to swallow’ (3P Sg. Inf.) |
| | <i>uhuk-</i> (stem) | <i>uhukwi</i> ‘they swallow’ (3P Pl. Pres.) |
| b. | <i>yul-</i> (root) | <i>yulnin</i> ‘to speak’ (3P Sg. Inf.) |
| | <i>yuyul-</i> (stem) | <i>yuyulna</i> ‘they spoke’ (3P Pl. Past) |
| c. | <i>daka-</i> (root) | <i>dakanin</i> ‘to hear’ (3P Sg. Inf.) |
| | <i>dakaka-</i> (stem) | <i>dakakawangh</i> ‘let them hear!’ (3P Pl. Imp.) |

(6) Prefixed Verb Third-Person Plural Formation

- | | | |
|----|--------------------------|--|
| a. | <i>suh-</i> (root) | <i>kal-suhnin</i> ‘to get tired’ (3P Sg. Inf.; <i>kal-</i> , refl. prefix) |
| | <i>kal-susuh-</i> (stem) | <i>kal-susuhwit</i> ‘if they get tired’ (3P Pl. Cond.) |
| b. | <i>bau-</i> (root) | <i>yul-baunin</i> ‘to converse’ (3P Sg. Inf.; <i>yul-</i> , recip. prefix) |
| | <i>yul-babau-</i> (stem) | <i>yul-babawi</i> ‘they converse’ (3P Pl. Pres.) |

5. SYNTAX AND DISCOURSE.

Tawahka is an SOV language and is (almost exclusively) head final, although adjectives follow nouns, which Ken Hale attributes to reduced relative clauses (Hale 1994: 264). The best-known syntactic feature of the Misumalpan languages is their penchant for clause chaining, involving sequential verbs and the concomitant feature of switch reference (Hale 1991). Here I will discuss a few discourse features not mentioned in the literature.

5.1 THE PAST PARTICLE *dai*³.

Although perfective aspect, the usual “past tense,” is marked in the verbs by the suffix *-na-*, the particle *dai* can be used in a number of contexts, both verbal and nominal, to indicate some aspect of an event or state previous to the focal time in the discourse (both perfective and imperfective).

(7) Uses of the Past Particle *dai* in Tawahka

- | | | | | | | |
|----|---|------------------|--------------|------------------|--------------------|------------|
| a. | <i>Papang-ki</i> | <i>sûl</i> | <i>bâs</i> | <i>du-wa</i> | <i>dai.</i> | |
| | father-my | dog | three | have-3SG.IMPERF | <u>PAST</u> | |
| | My father used to have three dogs. | | | | | |
| b. | <i>Alasnin</i> | <i>yulni</i> | <i>manah</i> | <i>witing</i> | <i>û-n</i> | <i>yak</i> |
| | cheer.up-3SG.INF | in.order.to | only | 3SG | house-3d sg poss | to |
| | <i>kiu-na</i> | <i>dai.</i> | | | | |
| | go-3SG.PERF | <u>PAST</u> | | | | |
| | He ₁ /she ₁ had gone to his ₂ /her ₂ house only to cheer him ₂ /her ₂ up. | | | | | |
| c. | <i>Tana</i> | <i>siknis-ni</i> | <i>dai</i> | <i>laih</i> | <i>apîs-ki.</i> | |
| | Tana | illness-3SG.POSS | <u>PAST</u> | TOP ₁ | recover-P.PART-3SG | |
| | As for Tana’s (previous) illness, she’s recovered. | | | | | |

³ PL = plural; SG = singular; POSS = possessive; INF = infinitive; P.PART = past participle; PRES = present; PERF = perfective; IMPERF = imperfective; TOP₁ = topicalizer #1; TOP₂ = topicalizer #2

- d. *Wahai-ki dai dau-na.*
 brother-my PAST die-3SG.PERF
 My brother died.
- e. *Wahai-ki umis-ni dai kîra-na.*
 brother-my bat-3d poss PAST run.away-3SG.PERF
 My brother's bat (that he used to have) ran away.

The striking characteristic here is that the particle *dai* functions equally with verbs and nouns to indicate previous time. In addition, in the case of nouns, it indicates a former state that no longer exists. Thus, example (7d) appears to have the force of “my former brother died,” implying that once dead, he is no longer functionally “my brother.”

5.2 THE TOPICALIZING PARTICLES *laih* AND *mik*.

Tawahka, like all the Misumalpan languages, is a subject-object language. Nevertheless, there are two topicalizing particles that appear to function ergatively. That is, they differ in that *laih* foregrounds elements in a non-Agent role, while *mik* foregrounds elements in an Agent role. Some examples are given in (8a-f).

(8) Tawahka Topicalizing Particle Usage

- a. *Yang pâk laih Yapuwas.*
 I/my place TOP₁ Yapuwas
My village is Yapuwas.
- b. *Sara laih wah kau û sisit-wa dai.*
 past TOP₁ liana with house tie-3PL.IMPERF PAST
In the past, they used to tie the houses together with lianas.
- c. *Papang-ki mik ispara nuhni as yâ-na.*
 father-my TOP₂ machete big one give.to.me-3SG.PERF
My father gave me a big machete.
- d. *Papang-ki laih yâ tal-na.*
 father-my TOP₁ me see-3SG.PERF
My father saw me.
- e. *Nanang-ma mik wala-n-bis yal yak laih parak as kala-na.*
 Mother-your TOP₂ child-3SG.POSS female to TOP₁ dress one
 give.to.him/her-3SG.PERF
Your mother gave her little girl a dress.

- f. *Papang-ki laih ispara nuhni as bakan-na.*
 father-my TOP₁ machete big one buy-3SG.PERF
My father bought a big machete.

Both of these particles focus attention on a specific element of the sentence and, therefore, fill the role of topicalizers (Crystal 1991: 354-55). The difference in their usage corresponds to the distinction between the roles of Agent and non-Agent (Crystal 1991: 12-13). According to David Crystal (1991: 124), the term *ergative* is applied to “constructions where there is a formal parallel between the *object* of a *transitive verb* and the *subject* of an intransitive one” (emphasis in original). Nouns or pronouns in this parallel situation are said to be marked as absolutive, while subjects of transitive verbs are marked as ergative. Ronald Langacker (1991: 243-249) discusses this phenomenon in terms of agentivity: more prototypical agents are marked as ergative, nonagents are marked as absolutive. In examples (8c) and (8e), above, the subjects of ‘gave’ are clearly acting in the role of agent and are followed by *mik*, while the substantives followed by *lah* in examples (8a), (8b), (8d) and (8e) are not agents. Interestingly, the substantive *sara* ‘past,’ in example (8b) is being used adverbially.

Example (8f) is a bit of a puzzle because the action of buying would appear to imply the action of an agent, and therefore the use of *mik* instead of *lah*. If an indirect object were present in the sentence so that the verb was in essence ‘buy for X,’ *mik* might very well have been used based on the model of the sentences involving giving. At present, it must remain a hypothesis that ‘to buy,’ at least in its perfective sense, does not license an agent automatically, but rather only if the buying is for the benefit of a different party from the subject of the sentence. The semantics of the verbs ‘to give’ (Section 6) lend credence to this distinction.

6. SEMANTICS OF THE VERBS ‘TO GIVE’.

In Tawahka, there are seven verbs corresponding to *to give* in English, formally involving the indirect object pronouns plus verb endings. Thus, rather than focusing on the action of giving, these verbs focus on the recipient. They are inflected according to the person and number of the agent. Compare the forms of the indirect object pronouns and the verbs *to give* (Tables 3 and 4 below).

	Singular	Plural (exclusive)	Plural (inclusive, general)
1P	<i>yâ</i> ‘to me’	<i>mai</i> ‘to us’	<i>yâna</i> ‘to us’
2P	<i>mâ</i> ‘to you’		<i>mâna</i> ‘to you’
3P	<i>kal</i> ‘to him/her’		<i>di</i> ‘to them’

TABLE 3: TAWAHKA INDIRECT OBJECT PRONOUNS.

	Singular	Plural (exclusive)	Plural (inclusive, general)
1P	<i>yânin</i> ‘to give to me’	<i>mayanin</i> ‘to give to us’	<i>yânanin</i> ‘to give to us’
2P	<i>mânin</i> ‘to give to you’		<i>mânanin</i> ‘to give to you’
3P	<i>kalanin</i> ‘to give to him/her’		<i>dianin</i> ‘to give to them’

TABLE 4: TAWAHKA VERBS ‘TO GIVE’. (3PSg. infinitive ending is *-nin*)

7. CONCLUDING REMARKS.

The Misumalpan languages exhibit a number of features that are uncommon in many of the better-known languages of the world. Aside from the extreme similarity of their grammars and a three-vowel system that includes phonemic length, in Tawahka these include affixation based on syllable weight, a particle that indicates past reference for both verbs and nouns, topicalizing particles that follow an ergative pattern, and verbs *to give* that are based on the indirect object pronouns. Much more remains to be learned, both for the benefit of the linguistic community and in the service of support for the Tawahkas themselves.

REFERENCES

- Benedicto, Elena & Ken Hale. 2000. Mayangna, a Sumu language: Its variants and its status within Misumalpan. In: Elena Benedicto (ed.), *University of Massachusetts Occasional Papers*, vol. 20, 75-106.
- Campbell, Lyle. 1997. *American Indian languages: The historical linguistics of Native America*. Oxford: Oxford University Press.
- Dixon, R.M.W. 1997. *The rise and fall of languages*. Cambridge: Cambridge University Press.
- García Ocampo, Luz Stella, Carmen Soledad Palacios de Berríos, Claudia Marcela Carías Chaverri & Suyapa Dilworth Ordóñez. 1998. *Tawahka tân minik bikis papatna “Ordenamiento de las semillas de la lengua tawahka” : Proceso de dotación de un sistema de escritura para la lengua tawahka*. Tegucigalpa: Instituto Hondureño de Antropología e Historia, Proyecto de Educación Bilingüe e Intercultural Tawahka, and Federación Indígena Tawahka de Honduras.
- Hale, Ken. 1991. Misumalpan verb sequencing constructions. In: Claire Lefebvre (ed.), *Serial verbs: Grammatical, comparative and cognitive approaches*, 1-35. Amsterdam/Philadelphia: John Benjamins.
- Hale, Ken. 1994. Preliminary observations on lexical and semantic primitives in the Misumalpan languages of Nicaragua. In: Cliff Goddard and Anna Wierzbicka (ed.),

- Semantic and lexical universals: Theory and empirical findings*, 263-83.
Amsterdam/Philadelphia: John Benjamins.
- Hale, Ken, and Danilo Salamanca. 2002. Theoretical and universal implications of certain verbal entries in dictionaries of the Misumalpan languages. In: William Frawley, Kenneth C. Hill, and Pamela Munro (eds.), *Making dictionaries: Preserving indigenous languages of the Americas*, 25-59. Berkeley: University of California Press.
- Kenstowicz, Michael. 1994. *Phonology in generative grammar*. Cambridge, MA, and Oxford: Blackwell.
- Ruhlen, Merritt. 1987 [1991]. *A guide to the world's languages*. Vol. 1: *Classification*. Stanford, CA: Stanford University Press.

THEME, THOUGHT, AND THEORY: JICARILLA APACHE CLASSIFICATORY VERB STEMS

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1. INTRODUCTION.

This paper explores the semantic parameters and domains involved in the classificatory verb system of Jicarilla Apache², a Southern Athabaskan language. Extremely rare in languages (Aikhenvald, 2000), CVSs are one mechanism for noun categorization. Young & Morgan (1980) defined CVSs in Navajo as “stems . . . [that] restrict such expression to specific classes of object or subject” (367). Hoijer et al. (1945) (quoted in Rushforth 1991:22) says that each of the classificatory verb stems “refers to a category of objects participating in an event, either as actor or goal.”

CVSs found in Athabaskan languages designate two types of situation: 1) stative CVSs, which incorporate subject or object (S/O) category specification (physical qualities) and spatial orientation (e.g., at rest, in position, or existence), and 2) motion CVSs, which describe an S/O involved in an event, and differ according to the type of movement referred to: handling by an agent, propulsion, or movement without the aid of an agent (Hoijer 1963; Young & Morgan 1980). Motion CVSs categorize the subject of an intransitive or the object of a transitive motion verb. The perceived physical attributes which underlie the categorization of noun referents by both stative and motion CVSs are number, shape, dimension, consistency, and animacy

In the examples below, I focus on motion CVSs in Jicarilla Apache, and particularly those which express continued contact by an agent (for example, carrying) or some sort of propulsion (throwing).

2. THE ATHABASKAN VERB.

Many Athabaskanists (e.g., Davidson et al. 1963; Young & Morgan 1980; Rushforth 1991; Rice 1989, 1999; Axelrod 1993; Jung 1999;) have characterized the Athabaskan verb as a complex construction, composed of an aspectually derived stem and prefixes. With regard to Navajo, Young & Morgan et al. (2000) write:

The VERBAL ROOT is a hypothetical element that embodies verbal meaning in abstract form, and that serves as the foundation upon which to derive the VERBAL STEMS. The verbal stem is derived from the underlying root by various processes, including suffixation and changes in vowel quality (oral/nasal, short/long, low/high tone). The stem conveys not only the root meaning, but [also], in many lexical derivatives, figurative meanings. (1)

The VERB THEME is composed of the verb root, voice/valence marker, plus other lexical prefixes common to a set of verbal derivatives (Axelrod 2000). The VERB BASE is generally accepted as

¹ I would like to thank the anonymous reviewers, editors, and language consultants for their assistance, suggestions, and contributions in preparing this paper for publication. I am deeply indebted to their collective efforts on behalf of my paper, its contents, and conclusions.

² Many thanks to my Jicarilla Apache language consultants, Mrs. Wilhelmina Phone, Maureen Olson, and Matilda Martinez, and to the Jicarilla Apache Culture Center in Dulce, New Mexico. This study was funded in part by an NSF grant – Principal Investigators, Melissa Axelrod and Jordan Lachler.

the verb theme minus the inflectional prefixes (Rice 1993). The verb base includes derivational affixes. Rich in semantics and morphology, the Southern Athabaskan verb complex can be illustrated as in Figure one (adapted from Jung 1999). Note that the verb stem is in position 0, the subject prefixes in positions 2 and 5, and the direct object prefixes in position 6.

10	9	8	7	##	6	5	4	3	2	1	0
post-positions	adv.	iterative	distrb./pl	disjunct boundary	DO	subj. 3 rd	qualifier (thematic, inceptive)	TAM	subj. (1 st & 2 nd sg & pl)	voice/valence	verb stem

FIGURE 1: SOUTHERN ATHABASKAN VERB CHART. (JUNG 1999)

The classificatory verb stems in Athabaskan are also found in position 0, at the rightmost edge of the verb construction. According to many (Basso 1990; Rushforth 1991; Hoijer 1954; Young & Morgan 1992; Axelrod 1993; Aikhenvald 2000), CVSs are used to categorize both a subject noun in a particular location or position and also a subject or object in motion by its physical qualities. PHYSICAL QUALITIES include shape, dimension, containment, animacy, consistency (mass vs. granular vs. liquid vs. solid state), and number. Stative verbs express the spatial location and/or existence of an S. MOTION verbs refer to the type of movement in an event: contact with an agent, no contact with an agent, and propulsion. The CVS category and the meanings associated with the derivational prefixes preceding the stem interplay in describing a nominal referent and its movement or position.

Tables 1 and 2 show the various CVS categories shared by thirteen different Athabaskan languages; in both tables, an X indicates that the specific CVS category (see footnotes below) is represented in the language.

S/O Category	Navajo	Chipewyan	Dogrib	Mattole	Galice
Solid, Round, Compact ³ (singular)	X	X	X	X	X
Slender, Rigid ⁴	X	X	X	X	X
Animate ⁵	X	X	X	X	X
Container & Contents ⁶	X	X	X	X	X
Flat, Flexible	X	X	X	X	X
Bulky	X				
Mass ⁷	X	X		X	
Rope-like	X			X	
Mushy	X	X	X		
Plural ⁸		X	X	X	X
Food			X		
Small Pieces of an S/O				X	

TABLE 1: NAVAJO, CHIPEWYAN, DOGRIB, MATTOLE, AND GALICE S/O CATEGORIES. (DAVIDSON ET AL. 1963)

³ Navajo has 1) singular, round S/O as well as 2) sphere. Dogrib S/Os are solid and compact, not necessarily round.

⁴ Navajo has two slender and rigid S/Os: singular and dual.

⁵ Animate includes humans and animals. In Chipewyan animate is singular.

⁶ In Navajo a container is rigid. Chipewyan has 1) bowl-like and 2) rigid containers. Dogrib has two container categories: 1) rigid and 2) large. Mattole does not necessarily include contents. Galice has two categories:

1) container with contents and 2) package-like S/O.

⁷ Mattole mass is granular.

⁸ Dogrib has two plural categories: 1) unlike S/Os and 2) like S/Os. Mattole includes 1) unlike S/Os with 2) rope-like S/Os in one category. Galice plural category contains 1) several S/Os, 2) a mass, 3) several people, and 4) rope-like S/Os.

THEME, THOUGHT, AND THEORY

Category of S/O	Mescalero	Western Apache	Slave ⁹	Bearlake	Koyukon	Hupa	Tlingit	Ahtna
Solid, Round, Compact ¹⁰	X	X	X	X	X	X	X	X
Slender, Rigid ¹¹	X	X	X		X	X	X	X
Animate (singular)	X	X	X	X		X	X	X
Container & Contents ¹²	X	X	X	X	X	X	X	X
Flat, Flexible	X	X	X	X	X	X		X
Pair of S/O				X				
Mass (dry, granular) ¹³	X			X	X	X	X	
Rope-like ¹⁴	X	X	X	X		X	X	
Food (edible S/O)					X			X
Mud-like/mushy mass	X	X		X	X	X		X
Solid (indefinite)				X				
Burning S/O					X			X
Plural ¹⁵		X			X	X	X	X
Fabric						X	X	X
Cumbersome							X	
Carryable on back							X	X
General or abstract							X	X
Enclosed S/O		X						X
Concealed S/O								X

TABLE 2: OTHER ATHABASKAN S/O CATEGORIES. (RUSHFORTH 1991; AXELROD 2000; RICE 1989; BASSO 1990; GOLLA AND O'NEILL 2001; STORY & NAISH 1973; KARI 1990)

3. JICARILLA CLASSIFICATORY VERB STEMS.

Based on the ethnography of communication approach, data have been collected and analyzed at both the micro-level and the macro-level. The data consist solely of transcribed linguistic interviews with linguistic consultants, all of whom are native speakers of Jicarilla Apache.

⁹ Slave may include up to four languages (or dialects), among them Bearlake (Rice 1989).

¹⁰ Mescalero category: single, solid, and inanimate. Koyukon specifies compact objects.

¹¹ Koyukon includes flat and rigid in this category. Slave also includes slender and flexible. Western Apache specifies the length is at least three times greater than width or height. Hupa includes basket in this category. Tlingit includes two groups: 1) long objects: simple and complex; not necessarily rigid, and 2) slender and rigid. Ahtna specifies elongated S/O only.

¹² Mescalero container categories are 1) shallow and open and 2) non-shallow and non-open. Bearlake specifies 1) shallow and open or 2) rigid container with contents. A second container category specifies flexible container. Slave specifies basin-like or long container (rigid and flexible) with contents. Hupa specifies filled container. Tlingit has two container categories: 1) with contents and 2) without contents. Koyukon specifies shallow, open container.

¹³ Mescalero has two mass categories: 1) dry and loose and 2) mud-like. Tlingit specifies grain-like.

¹⁴ Mescalero category includes 1) rope-like and 2) plural. Bearlake groups together 1) rope-like and 2) pair of S/O. Slave includes rope-like S/O with 1) slender and stiff and 2) slender and flexible. Hupa specifies rope and plural objects in the same category.

¹⁵ Koyukon specifies disorderly and scattered S/Os. Tlingit has three plurals: 1) any plural objects, 2) bundled plural objects, and 3) an aggregate of small items. Ahtna plurals are 1) plural S/O with liquids and 2) plural incorporated body parts.

In the Jicarilla Apache language, concrete entities in the world are assigned to ten categories (including a miscellaneous category) according to semantically salient features. Table 3 shows physical properties, semantic parameters, and the associated values and examples of these categories.

Physical Property	Semantic Parameter(s)	Value(s)	Example(s)
Dimension			
One	Length	Slender	Pencil
Two	Flatness	Flat, flappy	Blanket
Three	Sphere	Spherical	Strawberry
Shape	Sphere	Roundish or rollable	Orange
	Basin-likeness	Flat or basin-like, long & cylindrical	Log, plate, spoon
Consistency	Density	Solid/mushy/granular/liquid	Oatmeal, water
Containment	Contained	Contained/uncontained contents, loose/compact	Sack of flour, soda in a can
Number	Number	1, 2, 3+	A berry, pair of gloves, sand
Animacy	Animacy	Alive/previously alive whole being, or inanimate	Baby, deer
Miscellaneous	All Properties	Unclassified, indefinite	Guitar, wool (uncontained)

TABLE 3: JICARILLA APACHE PHYSICAL PROPERTIES, SEMANTIC PARAMETERS, AND VALUES FOR CONCRETE ENTITIES.

The motion CVSs are based on motion type (Young & Morgan 1992): 1) handling/continued contact by an agent: carry, lower, pick up, etc., 2) propulsion: throw, drop, toss, etc., and 3) no agent: fall, fly, etc. In imperfective and perfective modes, the various motion CVSs designate the various attributes of the object, along with motion type. The stative CVSs describe state, position (that is, spatial orientation: stand, sit, lie), or existence of the subject, concomitantly describing physical attributes as well as the number of the subject.¹⁶ Morphosyntactically, the CVS is incorporated into the polysynthetic word. The CVS does not refer to a specific S/O, but to physical properties of an S/O. Table 4 shows the categories, stems, descriptions, and examples of the handling and stative CVSs.

Category	Motion Stem	Stative Stem	Description	Example
Solid Round Obj.	-ʼai	ʼa	solid, round or compact	berry, tire
Slender Flexible Obj.	-lé	-lá	slender, flexible or pair	shoes, belt
Slender Stiff Obj.	-kii	-ká	slender, stiff, sticklike, or flat	pencil, spoon
Obj. in container	-kai ¹⁷	-ká	open container & contents	bowl of soup
Flat Flexible Obj.	-ł-tsos	-tsoos	flat and flexible	blanket
Animate	-ł-kee	-kii	alive or previously alive	baby, kitten
Mushy Matter	-łe	-łé	mushy matter	ointment, clay
Plural	-jei	-jei	3+ separable or granular	snow, sugar
Liquid	-zii	-kái	liquid (uncontained)	puddle
Contained Obj.	-kii	-kii	bag with contents	sack of piñons
Miscellaneous	-ʼii	-ʼii	non specific item	guitar

TABLE 4: JICARILLA APACHE HANDLING AND STATIVE CVSs.

¹⁶ Physical attributes: shape, dimension, consistency, containment, liquidity, animacy.

¹⁷ Differences in *contained* CVSs (Wilson & Martine 1996) may be because of dialectal variation.

The handling/continued contact by agent CVSs shown in Table 4 are described in the following sections.

3.1 SOLID, ROUND, OR COMPACT ITEMS: *-ai*¹⁸.

This stem *-ai* is used to refer to items in the category (henceforth referred to as SRO) that have at least one of the following salient features: 1) solid and/or roundish, and compact, or 2) a circular or rollable item. Because of their roundish and compact qualities, some items that are referred to by the stem *-ai* are an apple, a pumpkin, a chunk of cheese, a book, a filled or empty wooden or metal container, a closed sack, man axe (originally made from a roundish-shaped stone), and the heart of an animal (separated from body). Circular or ring-like objects, such as doughnuts are also referred to with this stem. As seen in example (1), stem *-ai* refers to the SRO category.

(1) *-ai* CVS

- a. *Jool sh a- n a- **ń** - 'ai*
 Ball 1.sg.O¹⁹.postposition - iterative - 2.sg.S - SRO stem
 Hand the ball back to me.
- b. *Dzé ma - **ń** - 'ai*
 Berry 3.sg.O.postposition - 2.sg.S - SRO stem
 Hand/give her/him a berry.

The examples in (1 a – b) reflect the salient characteristics of solid, round and compact in the objects referred to by these motion verbs. In stative verbs, the corresponding SRO stem is *-a*, as shown in example (1c):

- c. *Jool si - '**a***
 Ball TAM - SRO stem
 The ball is lying there.

3.2 SLENDER AND FLEXIBLE, ROPE-LIKE, AND/OR PAIRED: *-le*.

The salient characteristics of the category (henceforth referred to as SFO) specified by the stem *-le* are slender and flexible, rope-like, and/or paired items. Rope is one example of a flexible S/O. Most items that go around the body and that can be fastened are included: necklace, bracelet, or belt with clasp. Items that usually appear in pairs or two-like objects also pertain to this category: shoes, socks, eyeglasses, gloves, two beads, and twins *daleelt'é*. Examples (2 a – b) shows the salient characteristics reflected by the handling stem *-le*.

¹⁸ Stems are in bold in examples.

¹⁹ O signifies postpositional or direct Object, S is used as an abbreviation for Subject.

(2) **-le** CVS

- a. *Tl'ot sha - ḥ - lé*
 Rope 1.sg.O.postposition - 2.sg.S - SFO stem
 Hand/give me the rope.
- b. *Ké ni' - ḥ - lé*
Shoe TAM - 2.sg.S - SFO stem
 You put the shoes down.

Example 2 shows how the *-le* stem is employed to refer to an item that generally comes in pairs or is slender, flexible, and/or rope-like.

3.3 SLENDER AND STIFF, AND/OR FLAT AND RIGID: **-kii**²⁰.

The category of objects specified by the *-kii* stem (henceforth referred to as SSO) are either or both 1) slender and stiff: stick, knife, fork, feather, or 2) flat and rigid or bowl-shaped, (e.g., a cup, plate, or spoon). Cylindrical-shaped and slender items contained in this category are a pencil, log, stick, post, banana, and arrow. Examples in (3 a – b) with the stem *-kii* in bold, refer to items that fit in one or more of the following characteristics: 1) slender and stiff, or 2) bowl-shaped.

(3) **-kii** CVS

- a. *Besh naha - da - a - ḥ - **kii***
 Knife 1.pl.O.postposition - distr.pl. - TAM - 2.sg.S - SSO stem
 Hand/give us (3+) the knife.
- b. *Chish hi - sh - **kii** - t*
 Stick .peg.prefix²¹ - 1.sg.S - SSO stem - progressive
 I am carrying the stick.

3.4 OBJECT IN A CONTAINER: *-kai*.

The set of objects referred to by the *-kai* stem includes objects, usually liquids, in an open container, included a bowl of soup or a cup of coffee. The use of this stem is illustrated in examples (4 a – b).

(4) **-kai** CVS

- a. *kazil sha - ḥ - **kai***
 stew 1.pl.O.postposition - 2.sg.S – O in Container stem
 Give me the bowl of stew.

²⁰ Underline indicates nasalization.

²¹ The peg prefix carries no meaning but allows for appropriate syllable structure.

- b. *gahée sha - n̄ - kai*
 coffee 1.pl.O.postposition - 2.sg.S – O in Container stem
 Give me the cup of coffee.

3.5 FLAT AND FLEXIBLE: *-tsos*²².

The category of objects specified by the *-tsos* stem is comprised of flat and flexible, and/or flappy objects (henceforth referred to as FFO), such as a blanket, fresh (not dried) meat, a single piece of paper, and a bag without contents. As seen in examples (5 a – b), the *-tsos* stem expresses the salient qualities of the object referred to.

(5) *-tsos* CVS

- a. *Naaltsoozii ma - da - n̄ - t - tsos*
 Paper 3.sg.O.postposition - dist.pl.- 2.S - valence - FFO stem
 Hand/give them all the paper.
- b. *Biili sha - n̄ - t - tsos*
 Blanket 1.sg.O.postposition - 2.S - valence- FFO stem
 Give me the blanket.

The handling of flat and flexible and/or flappy objects are referred to by the *-tsos* CVS.

3.6 ANIMATE, PREVIOUSLY ANIMATE: *-kee*.

In this category specified by the *-kee* stem are found items such as humans, animals (alive or previously alive), fish, and insects. For inclusion in this group, an animal must be whole; otherwise, salient features of non-possessed body parts of the animal are focused upon. For example, when referring to an animal leg, the *-kii* stem is utilized due to its physical characteristics: cylindrical, slender, and stiff. Examples (6 a – b) illustrates use of the *-kee* stem, highlighting a referent's animacy.

(6) *-kee* CVS

- a. *Óozhazhíí Ma - da - n̄ - t - kee*
 Baby 3.sg.O.postposition - dist.pl - 2.sg.S - valence - Animate stem
 Hand/give them all the baby.
- b. *Moosha-zhaa hi - sh - ke - t*
 Cat-dimin. peg prefix - 1.sg.S - Animate stem - progressive
 I am carrying the kitten.

Any animate or previously animate whole beings are referred to by the *-kee* CVS.

²² Dialectal differences may account for the difference between *tsos* and *tsoos* (Wilson & Martine 1996).

3.7 MUSHY SUBSTANCE: *-tlee*.

The category of objects (henceforth referred to as MM) specified by the stem *-tlee* includes substances with a mushy texture or consistency: something mixed and/or mashed after being softened, mud, dried fruit that has been boiled, prepared oatmeal, and wet cement. Examples (7 a – b) demonstrates how the *-tlee* CVS stem is used in referring to wet mushy objects.

(7) *-tlee* CVS

- a. *Adóoli ma - da - ḥ - t - tlee*
Atole 3.sg.O.postposition - dist.pl. - 2.sg.S - MM stem (imperfective)
Hand/give them all the atole (corn meal mush).
- b. *Kaandis adóoliyee shi - n - tle*
Candace mush 1.sg.O.postposition - TAM - MM stem (perfective)
Candace threw mush at me.

As Example 7 shows, mushy consistency or texture is described incorporating the *-tlee* handling stem.

3.8 PLURAL [3+] OR SEPARABLE: *-jai*.

Items assigned to the category specified by the *-jai* stem are 1) three or more objects that are separable, 2) granular objects, such as: ground coffee, sugar, salt, and sand, 3) an aggregate of small pieces, such as coffee beans and beads, or 4) loose and uncontained objects, such as loose-leaf tobacco. Various uncontained items are represented in Example 8 by the *-jai* CVS.

(8) *-jai* CVS

- a. *ishoosh ma - da - ḥ - jei*
Salt 3.sg.O.postposition - distr.pl. - 2.sg.S - Plural stem
Hand/give them all the salt.
- b. *alóos sha - ḥ - jei*
Rice 1.sg.O.postposition - 2,sg,S - Plural stem
Hand/give me the rice.

3.9 LIQUIDS: *-t - ká*.

Uncontained liquids are referred to using the stem *ká* with an *-t* valence prefix. Uses of this stem are infrequent, typically in stative constructions, and usually refer to the presence of a puddle or pond. Compare example (9a) with the *-t* valence prefix, referring to uncontained liquid with the example in (9b) referring to water in a glass:

- (9) – ***ká*** CVS
 a. *Kóh si - t - ká*
 Water TAM – valence - Liquid stem
 Water is there (a puddle).
 b. *Kóh si - ká*
 Water TAM – O in Container stem
 Water is there (in a glass).

3.10 OPEN SACK OR CONTAINER WITH CONTENTS: *kii*.

This designation applies to an open bag with contents, such as piñons, wool, laundry, or flour. It is noteworthy that although items take on the shape of the container (e.g., round or slender) they will be categorized as an open container (henceforth referred to as OC). To demonstrate, both a bag of wool that is round in shape and a bag of piñons that has more of a flat shape qualify to be included in this category. Compare example (10), referring to an open bag of rice, with example (8b) above, which refers to loose rice not in a container.

- (10) – ***kii*** CVS
Alóos sha- n - t - kii
 Rice 1.sg.O.postposition- 2.sg.S-valence-OC stem
 Give me the (open) sack of rice.

3.11 MISCELLANEOUS ITEMS: –*ii*.

The miscellaneous or default category, which is specified by the –*ii* stem, includes any objects that are indefinite or do not fit into the above ten categories based on the previously described physical characteristics. Several examples of the miscellaneous category are a pencil sharpener, and dried jerky. Example 11 (a–b) shows several objects that do not fit the parameters of the aforementioned categories.

- (11) – ***ii*** CVS
 a. *Mek'echii mekanats 'ilts 'os 'i sha-n-'ii*
 pencil sharpener 1.sg.O.postposition – 2.sg.S - miscellaneous stem
 Give me the pencil sharpener.
 b. *Itsi hiltaiyi hi-sh-'ii*
 meat dried. peg prefix - 1.sg.S - misc. stem - progressive
 I am carrying the jerky.

As shown in the examples in (10), any item not exhibiting salient physical characteristics usually described by the other classificatory verb stems, is designated to the default category CVS –*ii*.

4. CONCEPTUAL SYSTEMS AND LINGUISTIC SEMANTICS.

Many cognitive theories (e.g., prototype theory, cognitive semantics) attempt to explain how underlying human reason and conception are expressed in language. In this research, I seek to examine the conceptual system reflected in the Jicarilla Apache language, examining in particular the categorization involved in the classificatory verb system.

According to prototype semantics, not all members of a category are equally representative of the group: some members are better exemplars than others. In other words, not all members of a category will necessarily share one specific feature. Similarly, a family resemblance model of conceptualization, such as Wittgenstein's example of games, shows that items in a particular category can be related not by one or even by a cluster of common characteristics (Gardner 1985). Prototype theory explains situations of conceptual category overlap and fuzzy boundaries like the ones we see in the Jicarilla Apache classificatory system. The assignment of referents into categories is possible because of information gained from the experience that native speakers have in common. A determination is made about whether an object is included in a category or contrasted with other members of the category by judging similarities and differences.

The importance of such systems of categorization in language is emphasized by Ellis (1993: 29) who states that language "simplifies the complexity of experience by reducing an infinite variety to a finite set of categories. There must be a considerable degree of processing of experience—of analyzing it, abstracting from it, focusing, and shaping it." Through language we come to focus on qualities that are especially salient within our experience and our culture and express those qualities through particular lexical and grammatical constructions. And, as experience shapes our linguistic categorization, so too does that linguistic categorization shape our understanding of the world. As Lakoff (1987: 3) puts it, "There is nothing more basic than categorization to our thought, perception, action, and speech."

The physical properties of a subject or object referent are the parameters of categorization in Jicarilla Apache CVSs, as shown in Table 3. Jicarilla Apache categories generally have a group of qualities that determine membership. For example, to conform to the SSO category criteria, an S/O must be both slender and stiff. Optionally, an item may be flat, like a plate, showing that 2-dimensionality and rigidity are particularly important characteristics in choosing this CVS to refer to a particular item.

Not all features of an item to be categorized will match all the criteria of a conceptual category. This supports a prototype analysis (Rosch et al. 1986; Lakoff 1987): a prototype has a cluster of attributes rather than a single defining quality. For instance, in the Jicarilla Apache classification system, a book is usually referred to using the SRO stem because a book is solid and compact, even though it is not round. Fuzzy boundaries exist in all the CVS categories. For example, a noodle falls into the SFO (Slender and Flexible, Rope-like or Paired) category because it is slender and flexible. A rope is in this category because it is similarly slender and flexible. Because a rope is typically made from two strands twisted together, paired items in general are also referred to by the SFO stem. This type of categorization is much like the radial category model discussed by Lakoff (1987). Upon initial inspection, chopsticks appear to fit conceptually in the SSO (Slender and Stiff or Flat and Rigid) category. However, because chopsticks come in pairs, they belong to the SFO category, which is used to refer to single flexible items, and also pairs.²³

²³ Section 5 elaborates on the semantic parameters and domain ordering and overlaps in categorization.

Conversely, an item may exhibit properties of several categories but is only designated to one. For example, three strawberries exhibit qualities of the SRO category: they are solid, round, and compact. However, *quanta* is the primary semantic parameter, so three strawberries are categorized by their plurality into the Plural (3+) category. Prototype theory predicts that, through experience, speakers recognize the salient features with which to categorize an item. The CVS system allows speakers to profile distinct forms of the same substance. For example, the SRO CVS can be used to designate a single, compact round of cheese, whereas the FFO CVS can be used to refer to a slice of cheese.

Of the attributes involved in classifying objects with CVSs, number supersedes other criteria; for example, two blankets are categorized as a pair (SFO) rather than flat and flappy (FFO), and three doughnuts are included in the PLURAL, not the SRO category. It appears that extensional dimension is also a basis for categories: one-dimensional (elongated), two-dimensional (flappy) and three-dimensional (rollable). Another basis for categorization involves consistency: solid and countable, vs. a mushy mass, vs. liquid. Domain ordering certainly seems to take place in Jicarilla Apache, as it does in Western Apache. Basso (1990) suggested the probable order in Western Apache: animacy, enclosed status, solid/plastic/liquid, number, rigid/flexible, and that length is three times the width. The ordering in Jicarilla Apache starts with number. Shape, dimension, and consistency may be the secondary parameters. Animacy and containment seem to be the final parameters considered in categorization. Overlap of semantic parameters is found in the following areas: 1) dimension and shape, 2) number and consistency, 3) shape and containment, 4) consistency and containment, and 5) shape and consistency. These overlaps create a distinctive and unique classificatory system that results in heterogeneous categories with fuzzy boundaries. Table 5 shows the various semantic parameters connected to each category.

Stem	Category	Semantic Parameters
-ai	SRO, solid, round, compact	Number, shape, dimension-consistency
-le	SFO, slender and flexible, ropelike or paired objects	Number, shape, dimension-consistency
-kii	SSO, sticklike	Number, shape, dimension-consistency
-tsos	FFO, flat flexible	Number, dimension-consistency
-jai	Plural	Number, dimension, consistency, containment
-tee	Mushy	Number (mass vs. count), dimension, consistency, containment
-zii	Liquids	Number (liquid vs. count or mass), dimension-consistency, containment
-kee	Animate	Number, animacy
kii	Contained	Containment
-ii	Miscellaneous	Default

TABLE 5: JICARILLA APACHE CLASSIFICATORY VERB STEMS AND SEMANTIC DOMAINS.

5. CONCLUSIONS.

The overlap of the semantic domains within the Athabaskan classificatory verb system allows for a very flexible and complex classification system. Basso (1980: 38) suggests: “Apache verb stems are governed not by grammatical rules, but by extralinguistic considerations, that is, by physical properties of the object or objects to which the speaker refers.” Others have also found extralinguistic factors to be significant in the use of the classificatory verb system (Axelrod 1993; Rushforth 1991; Aikhenvald 2000). And, as Davidson et al. (1963) point out, the Athabaskan CVSs express the qualities of noun referents explicitly, rather than categorizing them covertly. Stem choice in the CVS system depends on a speaker’s construal of both situation type and of the object referred to. As Croft (1998: 68) reminds us, “Deciding which segment of a fragment of experience counts . . . is obviously a complex cognitive process.” Construal involves real-world knowledge as well as cultural factors, aspects of speaker identity, and facts about the speech situation. The classificatory verb construction provides speakers with a great deal of flexibility in relating a conceptualization of an item in the real world, so that an appropriate characteristic of that item is profiled by the sentence.

Humans perceive the world in a similar way; it is their interpretations and conceptualizations of those perceptions that differ. The connection between perceptual apparatuses and conceptual structures is complex, but this connection is reflected in language. Perceptual mechanisms allow humans to acknowledge the existence of a thing in the world, and cognitive mechanisms allow for the understanding and conception of said item. It appears that the primary perceptual feature involved in choosing a CVS with which to refer to a particular item in Jicarilla Apache is number. CVSs are employed to assign things in the world into various categories for descriptive and anaphoric purposes. Categories originate from speakers in a speech community because of functionality. Usefulness and creation of categories will vary according to the community. Thus, the categorization system reflects culture²⁴ and cognition.

REFERENCES

- Aikhenvald, A. 2000. *Classifiers: A Typology of Noun Categorization*. Oxford University Press: London.
- Allan, K. 1977. Classifiers. *Language* 53: 284 – 310.
- Axelrod, M. 1993. *The Semantics of Time: Aspectual Categorization of Koyukon Athabaskan*. University of Nebraska Press: Lincoln.
- Basso, K. 1990. *Western Apache Language and Culture: Essays in Linguistic Anthropology*. University of New Mexico Press: Albuquerque.
- Boas, F. 1940. *The Limitations of the Comparative Method in Anthropology, Race, Language and Culture*. University of Chicago Press: Chicago.
- Comrie, B. 1976. *Aspect: An Introduction to the Study of Verbal and Related Problems*. Cambridge University Press: Cambridge.

²⁴ It is important to note here that although the various Athabaskan language communities shown in Tables 1 and 2 are closely related linguistically, they represent geographically diverse regions ranging from the Southwestern to the Northwestern United States and Canada. The languages of the Athabaskan language family include communities with cultures that are not uniform (e.g., Navajo culture and Slave culture have many differences); the CVS categories, however, are quite similar. The relationship of language to culture is very complex and material cultures seem to change more rapidly than do basic systems of grammar.

- Craig, C. (ed.). 1986. *Typological Studies in Language: Noun Classes and Categorization*. John Benjamins Publishing Company: Philadelphia.
- Davidson, W., Elford, L. W., Hoijer, H. 1963. *Studies in the Athabaskan Language*. University of California Berkeley Press: Berkeley.
- Ellis, J. 1993. The Heart of Language: Categorization. *Language, Thought, and Logic* (Chapter 3). Northwestern University Press: Evanston, IL.
- Faltz, L. *The Navajo Verb*. 1998. University of New Mexico Press: Albuquerque.
- Fernald, T., Platero, P. (eds.). 2000. *The Athabaskan Languages: Perspectives on a Native American Language Family*. Oxford University Press: London.
- Frake, C. 1980. *Language and Cultural Description Essays*. Stanford University Press: Stanford.
- Gardner, H. 1985. *The Mind's New Science: The History of the Cognitive Revolution*. Basic Books: New York.
- Goffman, E. 1974. *Frame Analysis: An Essay on Organization*. Harper & Row: New York.
- Golla, V., O'Neill, S. (eds.). 2001. *The Collected Works of Edward Sapir XIV: Northwest California Linguistics*. Mouton de Gruyter: New York.
- Gumperz, J., and Levinson, S. (eds.). 1996. *Rethinking Linguistic Relativity*. Cambridge University Press: Cambridge.
- Harris, R., and Taylor, T., 1989. *Landmarks in Linguistic Thought: The Western Tradition from Socrates to Saussure*. Routledge: London.
- Hayes, J. (ed.). 1970. *Cognition and the Development of Language*. John Wiley & Sons: New York.
- Hinton, L., and Munro, P. (eds.). 1998. *Studies in American Indian Languages: Description and Theory*. University of California Press: Berkeley.
- Hoijer, H. (ed.). 1954. *Language in Culture: Conference on the Interrelations of Language and other Aspects of Culture*. University of Chicago Press: Chicago.
- Hymes, D., Bidney, D., De Jong, P., and Leach, E. (eds.). 1967. *Studies in Southwestern Linguistics: Meaning and History in the Languages of the American Southwest*. Mouton & Co.: The Hague.
- Jackendoff, R. 1990. *Semantic Structures*. MIT Press, Cambridge, MA.
- Jackendoff, R. 1983. *Semantics and Cognition*. MIT Press: Cambridge, MA.
- Jung, D. 1999. *The Dynamics of Polysynthetic Morphology and Number Marking in Athabaskan*. Albuquerque, NM: University of New Mexico Dissertation.
- Kari, J. (ed.). 1990. *Ahtna Athabaskan Dictionary*. University of Alaska: Fairbanks.
- Kari, J. 1989. Affix Positions and Zones in the Athabaskan Verb Complex: Ahtna and Navajo. *International Journal of American Linguistics* 55(4): 424 – 54.
- Krauss, M. and Leer, J. 1983. Comparative Athabaskan-Eyak: Coursenotes. (MS.)
- Lakoff, G., 1987. *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago University Press: Chicago.
- Lehrer, A., Kittay, E. (eds.). 1992. *Frames, Fields, and Contrasts: New Essays in Semantic and Lexical Organization*. Lawrence Erlbaum Associates Publishers: Hillsdale.
- Lucy, J. 1992. *Language Diversity and Thought: A Reformulation of the Linguistic Relativity Hypothesis*. Cambridge University Press: Cambridge.
- Lyons, J. 1977. *Semantics*. Cambridge University Press: London.
- Rice, K. 1995. The Representation of the Perfective Suffix in the Athabaskan Language Family. *International Journal of American Linguistics* 61: 1-37.

- Rice, K. 1993. The Structure of the Slave (Northern Athabaskan) Verb. *Phonetics and Phonology: Studies in Lexical Phonology*.
- Rice, K. 1989. *A Grammar of Slave*. Mouton de Gruyter: Berlin.
- , 1999. *Morpheme Order and Semantic Scope: Word Formation in the Athabaskan Verb*. Cambridge: Cambridge U Press.
- Rushforth, S. 1991. Uses of Bearlake and Mescalero (Athabaskan) Classificatory Verbs. *International Journal of American Linguistics* 57(2): 251-66.
- Sapir, E. 1914. Notes on Chasta Costa Phonology and Morphology. In *The University of Pennsylvania: The University Museum Anthropological Publications vol. II no. 2*. The University Museum: Philadelphia.
- Shopen, T. (ed.). 1985. *Language Typology and Syntactic Description: Lexicalization Patterns: Semantic Structure in Lexical Forms*. Cambridge University Press: Cambridge.
- Silver, S., and Miller, W. 1997. *American Indian Languages: Cultural and Social Contexts*. University of Arizona Press: Tucson.
- Story, G., Naish, C. 1973. *Tlingit Verb Dictionary*. University of Alaska: College, AK.
- Wierzbicka, A. 1992. *Semantics, Culture, Cognition: Universal Human Concepts in Culture-Specific Configurations*. Oxford University Press: Oxford.
- Wilson, A., Martine, R. 1996. *Apache*. Audio Forum: Guilford, CT.
- Young, R. 2000. *The Navajo Verb System*. University of New Mexico Press: Albuquerque.
- Young, R., and Morgan, W. Sr. 1992. *The Analytical Lexicon of Navajo*. University of New Mexico Press: Albuquerque.
- Young, R., and Morgan, W. Sr. 1980. *The Navajo Language: A Grammar and Colloquial Dictionary*. University of New Mexico Press: Albuquerque.

ON GERMAN AND JAPANESE DATIVE CONSTRUCTIONS

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1. INTRODUCTION.

This paper compares the semantic characteristics of participants that occur with the dative case in German and certain participants that occur with the postposition *ni* and its variants in Japanese. The dative case in German and *ni* when used as a dative marker tend to mark experiencers. The use of the dative case to mark an experiencer is not uncommon cross-linguistically, but in Japanese the experiencer participant is considered to be part of a dative subject construction (Kuno 1973; Kabata & Rice 1997; Shibantani 1999, 2001; Kumashiro 2000), and in German the subject-like properties of the dative participant are rarely considered.

Using Langacker's (1991) archetypal model and Shibantani's (1999) notions of different degrees of dependency, we compare German and Japanese dative subjects. In both German and Japanese, the experiencer participants are active participants in the event, and they tend to be animate, definite, and the topic of the sentence. Consider (1) (Kabata & Rice 1997:114) and (2).¹

(1) *Kare ni wa musako no gokaku [sic]ga totemo uresikat-ta.*
He DAT TOP son GEN success S very happy-PAST
[As for him,] he was very pleased with his son's success.

(2) *Mir gefällt deine Bluse.*
Me-DAT please-PRES your blouse.
I like your blouse.

As (1) shows, in Japanese, these relations are marked by topic marker *wa* and subject marker *ga*. The semantic characteristics are often overtly marked in Japanese, but there is less overt marking in German. In this paper, we describe the event structure and other semantic properties of Japanese dative marked participants and show that the same types of semantic characteristics are found in German.

1.1 ARCHETYPAL MODEL.

Japanese linguists have traditionally claimed that postpositional particles indicate case relations in Japanese. These particles include nominative marker *ga*, accusative marker *o*, and dative marker *ni* as shown in (3) (Kuno 1973:5).

¹ The abbreviations used for glosses in this paper are as follows:

NOM	nominative	DAT	dative	TOP	topicalizer
ACC	accusative	GEN	genitive	COU	counter
NEG	negative	QUO	quotative	PAST	past tense
PRES	present tense				

- (3) *John ga Mary ni hon o yatta.*
 NOM DAT book ACC [give-PAST]
 John gave Mary a book.

However, there are some variations in case-marking patterns in Japanese. For instance, Japanese verbs expressing possession, capability, and perception or verbs with an ability auxiliary can appear in the following constructions: [noun phrase *ga*, noun phrase *ga*, verb phrase] or [noun phrase *ni*, noun phrase *ga*, verb phrase]. The dative subject construction or *ga/ni* alternation has been investigated in two different approaches: syntactic-based studies and semantic/discourse-based studies². Recently, Kabata (1998) has suggested that the *ga/ni* alternation is better explained as a semantic or cognitive phenomenon reflecting the nature of the agent/cognitive continuum. Kabata argues that the *ga/ni* alternation is more fully explained by Langacker’s (1991) archetype model, which has been also applied to German (Smith 1985, 1992, 2002).

According to Langacker (1991:238-9), the archetypal agent is a person who volitionally initiates a physical activity, whereas the archetypal experiencer is a sentient entity engaged in a mental activity. This model captures the essential non-categorical nature of agentive and experiencer roles, because it focuses on the interaction of clause participants and on the metaphor of energy transmission. The model that applies to both Japanese and German is illustrated in Figure 1 (Kabata & Rice 1997:111).

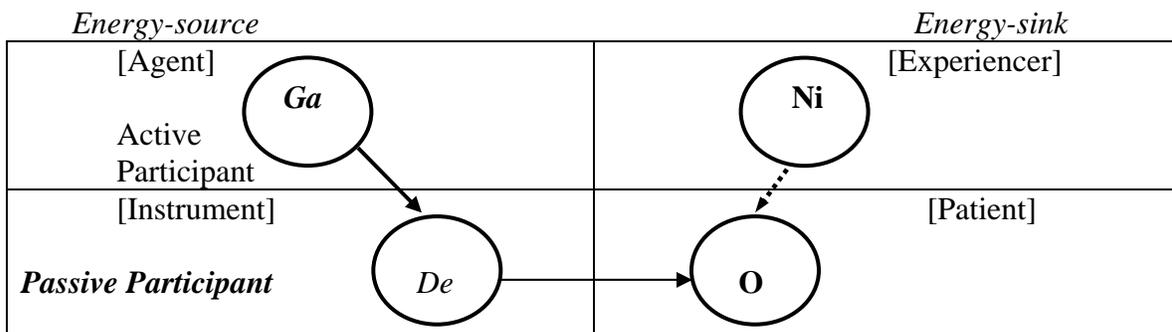


FIGURE 1: ARCHETYPAL MODEL. (KABATA AND RICE 1997:111)

As shown Figure 1, in Japanese, the nominative marker *ga* represents the highest rank in the energy flow (energy-source), coding both volitionality and agentivity in active participants, while the dative marker *ni* illustrates the lowest rank in the energy flow (energy-sink), coding a lack of volitionality and agentivity in active participants. By using native speakers’ grammatical judgments, Kabata (1998) and Masuda (1999) have shown that several semantic factors have an impact on the selection of *ga/ni* such as volitionality, inchoative, and negation with an intensifier.

Likewise, in German, the energy-source is encoded in the nominative case. The patient energy-sink is in the accusative case and the experiencer energy-sink is in the dative case.

² Syntactic-based studies are Kuno (1972), Shibatani (1977, 1978), Saito (1982), Takezawa (1987), Miyagawa (1989), Dubinsky (1992), Sadakane & Koizumi (1995), and Iwata (1997). Semantic-based studies are McGloin (1980), Watanabe (1984), Sugimoto (1986), Tsunoda (1991), Kabata & Rice (1997), Kabata (1998), Shitabatni (1999, 2001), Masuda (1999), Kumashiro (2000), and Sadler (2002).

Instruments are usually objects of dative prepositions. Smith (1985, 1992, 2002) has argued that the difference between the accusative and dative participants is the role that the participant plays in the event. The patient participant (accusative-marked) is passive, and the experiencer participant (dative-marked) is active.

In German, as in many languages, the dative case is used to mark nominals in the clausal realm that fit the experiencer prototype (Rudzka-Ostyn 1992:334; 1992:406; Foley & Van Valin 1984:101; Shibatani 1985:833; Wegener 1985; Dabrowska 1997). An experiencer is "an individual engaged in some type of mental process, be it intellectual, perceptual or emotive" (Langacker 1991a:236). In German, these nominals are indirect objects and objects of dative verbs.

In addition to being different from the agent, the experiencer is conceptually different from the patient (Smith 1992:406). Patients are affected by the action of the agent such that they undergo an external or internal change. Experiencers are also affected by the action of the agent. They do not, however, undergo change in the same way as a patient participant that is unable to react to its surroundings. Experiencer participants are actual or potential actors in their own right with respect to the action (1991b:401; Smith 1992:408) and thus differ significantly from patient participants. In other words, the dative case marks a high degree of personal involvement (Givón 1976:170). Further, Smith (1992:408) claims that in active clauses dative participants manifest a certain degree of independent potency of their own as a result of the actions of the agent.

1.2 NOTION OF DIFFERENT DEGREES OF DEPENDENCY.

Shibatani (1999:46) recants his earlier syntactic approach (1977, 1978) and proposes a semantically unified account from a cross-linguistic point of view. His new approach is that there are different degrees of dependency, and that the dative is on the continuum. Shibatani argues that the double subject construction and the dative subject construction are similar in that both occur with a small subject and a large subject. The difference between the two constructions is the degree of dependency of the predicate clause, which provides us with a clue as to "how the large subject is relevant to the state of affairs expressed in the predicate clause" (Shibatani 1999:68). The degree of dependency of the predicate on the large subject is high for the double subject construction, while it is low for the dative subject construction³.

1.3 DOUBLE SUBJECT CONSTRUCTION AND DATIVE SUBJECT CONSTRUCTION.

Shibatani (1999, 2001) claims that it is crucial to understand the double subject construction in order to understand the dative subject construction. The double subject construction is a construction in which there are two nominative subjects used with one predicate. Example (4), which has two nominative subjects, *zoo-ga* 'elephant-NOM' and *hana-ga* 'nose-NOM', is a double subject construction. The meaning of (4) is such that the predicate of the clause *hana-ga nagai*, 'a nose is long' is dependent upon the preceding noun phrase, *zoo-ga*.

³ Kumashiro (2000: chapter 4), from the perspective of cognitive grammar, proposes a similar view. Kumashiro claims that there are three different types of "setting-participants" constructions for the *ni*-NP and *ga*-NP construction: (1) participant-subject, (2) setting-subject, and (3) split subject. What has been traditionally argued as the dative subject construction, according to Kumashiro, is categorized as (2) setting-subject. They are different with respect to the subjecthood of the *ga*-marked noun phrase.

- (4) *Zoo-ga Hana-ga nagai*
 elephant-NOM nose-NOM long
 [that] An elephant has a long nose/trunk.

The structure of (4) is illustrated in Figure 2. The small subject, according to Shibatani, refers to an internal subject *hana-ga*, while the large subject refers to an external one, *zoo-ga*.

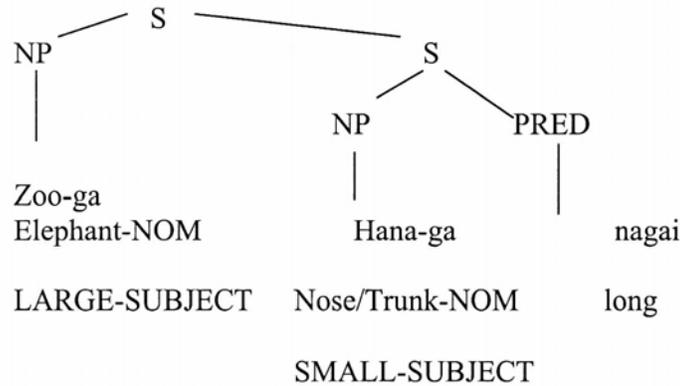


FIGURE 2: DOUBLE SUBJECT CONSTRUCTION. (Shibatani 1999:61)

According to Shibatani (1999: 62), the internal clause of the double subject construction has certain semantic characteristics. That is, it usually expresses a state of affairs that is not universally true⁴. It is noteworthy that under this analysis the large subject is not a direct argument of the lexical predicate, and that the notion of “dependency” provides a better explanation for this type of construction cross-linguistically. The large subject functions as either a domain or a cognizer through which the meaning of the clause can be fully realized.

Likewise, the dative subject construction depends on the large subject, but with lesser degree of dependency compared to the double subject construction discussed above. Shibatani (1999, 2001) also points out that the dative subject construction represents a state of affairs that is not controllable, and the dative-marked subject functions as a cognizer on which the clause is less dependent. In the double subject construction, the clause depends heavily on the internal/small subject rather than an external/large subject. Below, we apply this analysis to the German dative construction.

⁴ (i) *Hana-ga nagai* (ii) *Chikyuu-ga marui*
 nose-NOM long earth-NOM round
 ‘a nose/trunk is long’ ‘the earth is round’

For instance, *hana-ga nagai* as in (i) is dependent upon the speaker’s judgment as to how long something has to be in order to be considered long. This stands in contrast to the state of affairs expressed by *chikyuu-ga marui* in (ii), which, in this century, is universally accepted to be true. In (ii), the nominative noun phrase, *chikyuu-ga*, plays the role of narrowing down the domain for the internal clause of the construction so that the statement of the small subject is universally true. A similar observation has been made by Kumashiro (2000). His explanation for this type of construction involves metonymy: “what the dative nominal actually designates or profiles is a human entity, but it metonymically refers to an entity closely associated with it, i.e., its domain of application, defined as a set of propositions believed to hold true for the individual” (Kumashiro 2000:88).

2. METHODOLOGY.

This section addresses the methodological issues relevant to the collection of data for this study. The use of natural language data is something that some Japanese linguists have started to seriously consider. These include Ono, Thompson & Suzuki (2000), Ono & Sadler (2000); Masuda (2002); and Sadler (2002). Sadler (2002) uses text from classical Japanese and spoken/written (novels) Modern Japanese to analyze the dative subject construction. She found that the dative construction is rarely used in spoken Japanese, while it is more likely to occur in written text. In German, there are no corpus-based studies solely of this construction.

In this study, the Japanese data was collected from two different major newspapers, *Asahi* and *Yomiuri*. The morning edition was taken for each newspaper from August 2 through September 6, 2002. *Ni*-marked participants as well as participants marked by its variants such as *niwa*, *nimo*, *ni totte*, and *ni dake* are included. Verbs such as possessive, ability, and perception as well as adjective/nominal adjectives were entered in this analysis. This survey resulted in 92 examples that were marked by *ni* or its variants.

Data was also collected from German newspapers. The German newspapers, *Frankfurter Allgemeine (FAZ)* and *Süddeutsche Zeitung (SZ)*, are national, daily papers. They are the rough equivalents of *The New York Times* and the *Christian Science Monitor*. The German newspapers target an audience beyond their local area that is well educated and concerned about keeping up with current issues and events.

Each German newspaper provides roughly half of the 72 German examples. All of the issues were from July and August, 2002 and the issues were randomly selected. The data come from *FAZ* and *SZ* on July 29, *FAZ* and *SZ* on July 30, *SZ* on July 31, *FAZ* and *SZ* on August 1, *FAZ* and *SZ* on August 2, and *FAZ* and *SZ* on August 9. These eleven issues provide 60,000 words of text that contained 72 dative verb constructions. Verbs considered to be dative were taken from the list provided by Duden (1984:608-611). Ditransitives and datives with adjectives were not included, although participants in those constructions are often experiencers.

3. RESULTS.

We analyze the data according to four parameters, Langacker's (1991b) topicality factors: 1) location on the action chain, 2) location on the empathy hierarchy, 3) definiteness, and 4) profile/base organization. The notion of profile/base corresponds to Shibatani's notion of large and small subjects. Before discussing the Japanese and German data, we want to point out that the term *topicality factor* can be confusing. Topicality has long been connected with subjecthood (Givón 1976, 1983, 1984), and in Cognitive Grammar, topicality is described by four different aspects of relations between clausal participants, i.e., the topicality factors. Although Langacker uses the topicality factors to discuss both subject and topic, he maintains that subject and topic are distinct concepts (Langacker 1991b:315). Langacker (1991b:313) states that the subject is part of a clause and that the topic is part of discourse. He defines the topic as "the specific conceptual realm [within the mental world of the speech-act participants] with respect to which the clause is meant to be interpreted and into which its content is integrated" (Langacker 1991b:314). Further, the topic is a subjective reference point used to establish mental contact with other entities in the discourse. In short, subject is a clause-internal notion, and topic is a discourse notion. Langacker (1991b:306) claims that prototypical subjects show the semantic characteristics of the topicality factors.

3.1 LOCATION ON THE ACTION CHAIN.

In Japanese, there were 92 cases in our study where participants are marked by the dative case *ni* or its variants *niwa*, *nimo*, *ni totte*, and *ni dake*. The majority of participants, 95%, are animate and thus experiencers of the action designated by the verb. Five percent of the dative participants are inanimate. Therefore, the majority of participants fit into the model provided by Kabata & Rice (1997:111), in which the dative participant is active. Consider (5) and (6), which show animate participants.

(5) *watashi ni wa chuugakusei to shoogakusei*
 I DAT TOP jr. high school student and elementary school
no 3 nin no kodomo ga imasu
 GEN 3-COU children NOM exist (animate)
 I have three junior high school and elementary school children. [*Yomuri* 8.13.02]

(6) *makiko san ni wa jiryuu o mikiwame*
Ms. Makiko DAT TOP current of the time ACC ascertain
mizukara nagare o tukuridasu chikara ga atta
 oneself current ACC create power NOM exist (inanimate) PAST
 Ms. Makiko Tanaka has the power to ascertain the current of the time and to create a current by herself. [*Asahi* 8.11.02]

Table 1 shows the frequency of the dative subject marker and its variants by participant type in the study data.

	I/We	You	Main characters	Other Animate	Body	Location	Inanimate	Total
Newspaper	25	0	9	36	4	13	5	92
Percent	27%	0%	10%	39%	4%	14%	5%	100%

TABLE 1: JAPANESE DATIVE PARTICIPANTS.

There is one point that we would like to discuss regarding the newspaper data, that of locational nouns. There are five cases where a location is used with the dative construction. These five cases seem to be inanimate dative subject constructions, but a careful examination tells us that the usage of locational nouns conveys animate participants who are involved in specific locations. Two examples are shown in (7) and (8)⁵.

(7) *yokohama ni-wa matsuzaka to iu kirifuda ga ita*
 Yokohama DAT-TOP Mr. Matsuzaka QUO say trump NOM exist (animate) PAST
 Yokohama Bay Stars has an ace, Mr. Matsuzaka. [*Asahi* 8.5.02]

⁵ Examples (7) and (8) are the equivalents of “participant subjects” in Kumashiro’s analysis.

- (8) *tookyoo ni genki ga naito, keizaikai ga fuyoo shinai*
 Tokyo DAT spirits GEN be-NEG-if economic world NOM move-NEG
 ...when there are no spirits in Tokyo, then there is no movement in the economic world.
 [Asahi 8.18.02]

In (7), *yokohama* is *ni*-marked, which indicates the place Mr. Matsuzaka exists. Yokohama denotes the Yokohama Bay Stars, which is a baseball team, a collection of animate individuals to which Matsuzaka belongs. His being an ace takes place within the location of the team. In (8), *ni* marks *tookyoo*, which is the center of economics and business in Japan (Tokyo). The locational noun, Tokyo, can be interpreted as a group of people who are engaged in and play a major role in business. Tokyo itself does not affect the world economy, but the people who work there do. In other words, these locational nouns are inanimate, but it is clear that they are referring to human beings.

In the German data, 46 of 72 examples have animate dative participants. This means that over half of the participants (64%) are true experiencers. There are 26 participants that are inanimate and, as such, they cannot be experiencers of anything. Consider (9), which has a prototypical dative participant, and (10), which has an inanimate participant.

- (9) *Man sucht sich die Seminarthemen, die einem passen*
 one NOM seeks REFL the seminar topics ACC, that NOM one DAT suit
 One seeks out the seminar topics that suit one. [FAZ 7.31.02]
- (10) *...sie [Freimeilen] hätten ja... dem Staat auch Geld sparen helfen können*
 they [frequent flier miles] NOM had indeed the state DAT also money save help can
 they [frequent flier miles] could have indeed helped the state save money. [SZ 8.2.02]

In German, as in Japanese, there is often another participant. In German, that participant is in the nominative case. The nominative-marked participant is considered to be the subject, although it is often neither animate, definite nor the profiled portion of the internal clause. The nominative participant is considered to be the subject because it shows subject-verb agreement and the prototypical case for subjects. The dative participant that is often animate, definite, and the profiled portion of the internal clause, is not considered to be a subject. As can be argued for Japanese, the dative participants in German are often experiencers or large subjects. The breakdown of the dative participants for German by type is shown in Table 2.

	I/We	You	Topic	Other Animate	Body	Location	Inanimate	Total
Newspaper	3	0	33*	43	0	6	20	72
Percent	1%	0%	45%*	59%	0	1%	27%	100%

TABLE 2: GERMAN DATIVE PARTICIPANTS.

*Topic overlaps with other categories

Unlike Japanese, German does not have an independent marker for topic. Topic is a matter of position in the sentence and context. Thus, some of the 33 participants that are topics are animate and some are inanimate. The lack of specific topic marker also makes it hard to assess the dependency of the participants to determine which is the large or small subject.

3.2 LOCATION ON THE EMPATHY HIERARCHY.

The Empathy Hierarchy (cf. Silverstein 1976; Dixon 1979) ranks entities according to their ability to attract a speaker's empathy. The highest degree of empathy goes to the speaker because one identifies most with oneself. The hierarchy begins with the speaker and goes as follows: speaker > hearer > human > animal > physical object > abstract entity.

In the Japanese data, third person animate participants appear in conjunction with the dative and its variants most frequently in the newspaper data (45%). First person participants are the next most frequent (27%), followed by the main characters (13%)⁶. There are no occurrences of a *ni*-marked second person pronoun participants in the newspaper data. This is not surprising for stylistic reasons. Thus 70 of the 92 examples are in the first three categories on the left of the empathy hierarchy⁷. Only five of *ni*-marked inanimate nouns in the newspaper data are abstract nouns, such as *kyoiku* 'education' and *azia no heiwa to antee* 'peace and stability in Asia'.

In the German data, third person animate participants are also the most common with 43. There are only three first person participants. Like the Japanese data, there are no occurrences of the second person, most likely for stylistic reasons. Thus 46 of the 72 examples are higher on the Empathy Hierarchy. This means that 26 examples are lower on the Empathy Hierarchy because they are inanimate. This does not fit completely with the analysis that dative participants are experiencers, although this may be the prototype. The inanimate dative participants in German represent the range from concrete objects to abstract concepts.

3.3 DEFINITENESS.

Next, we would like to discuss the definiteness of the subjects marked by *ni* and its variants. Definiteness is determined by whether the speaker and hearer have established mental contact with some entity (Langacker 1991b:307). Subjects tend to be definite (Givón 1979:51; Croft 1991:308) rather than indefinite. Langacker (1991b:308) gives the Definiteness Hierarchy as: definite > specific indefinite > non-specific indefinite.

In the Japanese data, there are 62 definite participants and 30 indefinite participants. There is only one indefinite pronoun that is marked by a variant of *ni*.

In the German data 67 of the 72 dative participants are high on the definiteness scale. There are 40 definite articles, 22 pronouns, 5 demonstrative pronouns and 5 indefinite articles. Among the indefinite articles, 2 are animate and 3 are inanimate.

⁶ Sadler (2002) points out that in the narrative portion of novels, the *ni*-marked first person is 32% while the *ni*-marked third person is 68%.

⁷ The majority of *ni*-marked (and variant) participants are possibly first person if we take "perspective issues" into consideration. For instance, the main characters in the newspaper data (10%) are closer to first person in nature because they appear in the columns that are written from the third person perspective (e.g., economics, politics, internationals, sports), rather than first person perspective (e.g., advice, interview). Some of the other animate things are more like first person because they appear in columns that are written from third person perspective. Given this, the results from the newspaper data seem to be high on the Empathy Hierarchy since the majority of *ni* and its variants marked participants are first person in nature. Nonetheless, further investigation is needed.

3.4 PROFILE/BASE ORGANIZATION.

Profile/base organization is determined by the speaker’s construal of an event. It is the speaker’s representation that allows an agentive or experiencer participant to become the profiled participant in the clause. The clause-level profiled participant corresponds to Shibatani’s large subject. This profiled participant is often the topic of a sentence, but not always. There are 34 cases in Japanese where the dative participant is the subject of the clause.

The dative subject is often topicalized as previously shown in (1). *Wa* has two functions: a contrastive marker and a topic marker. Twenty-six out of 34 occurrences (76%) of *wa* in *niwa* are used as a topic marker, while the remaining 8 occurrences (24%) of *wa* in *niwa* are used as a contrastive marker. Dative participants appear in conjunction with *niwa* and *ni totte* most frequently, 36.5% each. In many cases, *ni totte*-marked participants co-occurred with adjectives and nominals rather than with potential, possessive, or perception verbs. Table 3 shows the distribution of Japanese dative subject markers and their variants in the newspaper data.

	<i>Ni</i>	<i>niwa</i>	<i>nimo</i>	<i>Nitotte</i>	Other	Total
Newspaper	14	34	9	34	1	92
Percent	16%	36.5%	10%	36.5%	1%	100%

TABLE 3: JAPANESE DATIVE SUBJECT MARKERS.

In German, subject and topic often overlap, but can be different participants. In the case of the dative construction, it can be difficult to determine which is the large or small subject. The dative participant is often the large subject, and the nominative participant is often the small subject. The large subject is the one with a high degree of dependency on the predicate and the small subject has a low degree of dependency on the predicate. Consider (11) and (12).

- (11) *Die Freimeilen gehörten nämlich ihnen*
 The frequent NOM flier miles belong [to] them DAT. [SZ 8.2.02]

- (12) *Doch nicht immer gelingt es den Mitarbeitern*
 It isn’t always worth it NOM [to] the workers DAT. [FAZ 7.30.02]

In (11), there is a nominative and a dative participant. The nominative participant is inanimate, low on the empathy hierarchy, definite, and the topic. It has two semantic claims to subjecthood, and it corresponds to Shibatani’s large subject. The dative participant is animate, high on the Empathy Hierarchy, definite, but not the topic. The dative participant is the small subject because it is less dependent on the predicate and it gives a place for the ‘frequent flier miles’ to belong. Further, the nominative participant licenses verb agreement, which is the usual criterion for subjecthood in German.

In (12), there is a similar situation with a nominative and a dative participant. The nominative participant is inanimate and maximally abstract, low on the Empathy Hierarchy, definite, and the large subject. The dative participant is animate, high on the Empathy Hierarchy, definite, the topic, and the large subject. The dative participant exists within the discourse space established by the maximally non-specific pronoun *es* and has a high degree of dependency on the predicate.

In German, the notion of large and small subject can be fruitfully applied to help elucidate the semantic nature of the nominative and dative participants in clauses with dative verbs. This construction is similar to the dative subject construction in Japanese, and we think that dative verbs are examples of the dative subject construction. What looms large for German is the issue of subject-verb agreement. Dative participants have many semantic properties of subjecthood but are never called subjects because they do not license verb agreement. Nominative participants often have few semantic properties of subjecthood but are called subjects because of verb agreement. Because degree of dependency is the criterion for large or small subject, it seems that in German it depends on the predicate and the context whether the nominative or dative participant corresponds to Shibatani's (1999) large or small subject.

4. CONCLUSION.

In this paper, we have examined the semantic nature of German and Japanese dative subject constructions by focusing on newspaper data. The Japanese dative subject construction has a range of variants, such as *nimo*, *niwa*, and *ni dake*. Prototypical German and Japanese dative participants are animate and definite. Japanese dative subjects are also higher on the Empathy Hierarchy, but in German only about half of the dative participants are higher on the Empathy Hierarchy. A high rating on the Empathy Hierarchy may be prototypical, but there are many examples that deviate from the prototype. In both German and Japanese, there are large and small subjects that are more or less dependent on the predicate.

REFERENCES

- Croft, William. 1991. *Syntactic Categories and Grammatical Relations. The Cognitive Organization of Information*. Chicago: The University of Chicago Press.
- Dabrowska, Ewa. 1997. *Cognitive Semantics and the Polish Dative*. Berlin: Mouton de Gruyter.
- Dixon, R.M.W. 1979. Ergativity. *Language* 55:59-138.
- Dubinsky, Stanley. 1992. Case Assignment to VP-adjoined positions: nominative objects in Japanese. *Linguistics* 30:873-910.
- Foley, William A. and Robert D. Van Valin. 1984. *Functional Syntax and Universal Grammar*. Cambridge: Cambridge University Press.
- Givón, Talmy. 1984. *Syntax: A Functional-Typological Introduction, vol I*. Amsterdam: John Benjamins.
- , 1983. Topic Continuity in Discourse: The Functional Domain of Switch-reference. *Switch-reference and Universal Grammar*, ed. by John Haiman and Pamela Munro, 51-82. Amsterdam: John Benjamins.
- , 1979. *On Understanding Grammar*. New York: Academic Press.
- , 1976. Topic, Pronoun and Grammatical Agreement. *Subject and Topic*, ed. by Charles N. Li, 149 - 88. New York: Academic Press.
- Kabata, Kaori. 1998. On the Agent/experience continuum: A cognitive approach to the *ga/ni* alternation in Japanese. Unpublished manuscript.
- Kabata, Kaori and Sally Rice. 1997. Japanese *ni*: The particulars of a somewhat contradictory particle. *Lexical and syntactical constructions and the construction of meaning*, ed.

- by Marjolijn Verspoor, Kee Lee, and Eve Sweetser, 109-27. Amsterdam: John Benjamins.
- Kumashiro, Toshiyuki. 2000. *The conceptual basis of grammar: A Cognitive approach to Japanese clausal structure*. PhD. Dissertation, University of California, San Diego.
- Kuno, Susumu. 1973. *The Structure of Japanese*. Cambridge: MIT Press.
- . 1972. Functional sentence perspective: a case study from Japanese and English. *Linguistic Inquiry* 3:269-320.
- Langacker, Ronald. 1991a. *Concept, Image and Symbol: The Cognitive Basis of Grammar*. Berlin: Mouton de Gruyter.
- 1991b. *Foundations of Cognitive Grammar, vol. 2*. Stanford: Stanford University Press.
- Masuda, Kyoko. 2002. *A Cognitive Grammar Approach to Japanese Locative Postpositions ni and de: A case study of spoken and written discourse*. Ph.D dissertation, University of Arizona.
- . 1999. Japanese Postpositions *ni* and *de*: A cognitive linguistic approach. Poster presented at the Seventh International Cognitive Linguistics Conference, University of Stockholm.
- McGloin, Naomi H. 1980. *Ga/ni* conversion re-examined. *Papers in Japanese Linguistics* 7:65-77.
- Miyagawa, Shigeru. 1989. *Syntax and Semantics 22: Structure and Case Marking in Japanese*. New York: Academic Press.
- Ono, Tsuyoshi and Sadler Misumi. 2001. *The status of 'canonical' transitive clauses in Japanese conversation*. Paper presented at the 11th Japanese Korean Linguistics, UC Santa Barbara.
- Ono, Tsuyoshi, Sandra A. Thompson, and Ryoko Suzuki. 2000. The pragmatic nature of the so-called subject marker *ga* in Japanese: evidence from conversation. *Discourse Studies* 2: 35-64.
- Rudzka-Ostyn, Brygida. 1992. Case Relations in Cognitive Grammar. *Tijdschrift voor Germaanse Filologie* 81.1-3:327-373.
- Sadakane, Kumi and Masatoshi Koizumi. 1995. On the nature of 'dative' particle in Japanese. *Linguistics* 33:5-33.
- Sadler, Misumi. 2002. Deconstructing the Japanese "dative subject" construction. Ph.D dissertation, University of Arizona.
- Saito, Mamoru. 1985. *Some asymmetries in Japanese and their theoretical implications*. Ph.D. dissertation, Massachusetts Institute of Technology.
- . 1982. Case marking in Japanese: a preliminary study. Unpublished manuscript. MIT.
- Shibatani, Masayoshi. 2001. Non-canonical constructions in Japanese. In A. Y. Akihenvald & R.M. W. Dixon & M. Onishi (eds.), *Non-Canonical Marking of Subjects and Objects*, 307-354. Amsterdam/Philadelphia: John Benjamins.
- . 1999. Dative subject construction twenty-two years later. *Studies in the Linguistic Sciences* 29: 2, 45-76.
- . 1985. Passives and Related Constructions: A Prototype Analysis. *Language* 61:821-848.
- . 1978. *Nihongo no bunseki*. An analysis of Japanese language. Tokyo: Taishuukan.
- . 1977. Grammatical relations and surface cases. *Language* 53:789-809.
- Silverstein, Michael. 1976. Hierarchy of Features and Ergativity. *Grammatical Categories in Australian Languages*, ed. by R.M.W. Dixon, 112-71. Canberra: Australian Institute of Aboriginal Studies.

- Smith, Michael. 2002. The polysemy of German *es*, iconicity, and the notion of conceptual distance. *Cognitive Linguistics* 13.1:67-112.
- , 1992. The role of image schemas in German grammar. *Leuvense Bijdragen* 81:385-410.
- , 1985. Event chains, grammatical relations, and the semantics of case in German. In *Proceedings from the 21st Annual Regional Meeting of the Chicago Linguistic Society*, ed. by William H Eilfort, Paul D. Kroeber and Karen L. Peterson, 388-407. Chicago: Chicago Linguistic Society.
- Sugamoto, Nobuko. 1982. Transitivity and objecthood in Japanese. In *Syntax and Semantics 15*, ed. by Paul Hopper and Sandra Thompson, 423-447. New York: Academic Press.
- Takezawa, Koichi. 1987. *A configurational approach to case-marking in Japanese*. Ph.D. dissertation, University of Washington.
- Watanabe, Yasuko. 1984. Transitivity and evidentiality in Japanese. *Studies in Language* 8.2:235-251.
- Wegener, Heide. 1985. *Der Dativ im heutigen Deutsch*. Tübingen: Gunter Narr.

FROM R TO ʁ VIA Z AND L: RETHINKING THE HISTORY OF FRENCH /r/

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1. INTRODUCTION.

In this paper, I provide a new analysis of the 17th century replacement of apical [r] by dorsal [ʁ] in French in the light of Relational Phonology (RP) Theory.¹ It is my thesis that such a description of change and explanation of its trajectory sheds new light on the phenomenon in general and highlights the advantages of this working theory, for both diachronic and synchronic enterprises.

1.1 OVERVIEW OF THE FRENCH RHOTIC SHIFT.

Most available evidence suggests that the phonological Romance /r/ inherited by Northern French dialects was apical (Runge 1974:47). Further support for an original apical rhotic comes from patterns of r – z alternation in Early French and most discussion of /r/ in French begins with the presumption that this sound remained fundamentally apical prior to the 16th century (Martinet 1962:195). The mid- to late-17th century data provide abundant indirect evidence for the growing tension between and simultaneous presence of apical and dorsal rhotics, of which the latter enjoyed growing popularity (Delattre 1966, Lancaster 1934). The 17th century grammarian Andry de Boisregard distinguishes between two types of dorsal rhotics, that of the court and that of common Parisians. The former was said to be softer and less vulgar than the latter, which was described as a harsh and grating sound (Straka 1965:573). By all accounts, the upper classes adopted the ‘r-grasseyé’ or dorsal [ʁ] by the end of the 17th century, all but banishing apical [r] to lower class and regional varieties of French. One notable phonetic explanation of this tendency is given by Delattre (1966:207), who suggests that the genesis of this change was a need for articulatory simplicity and that, “the change from apical to uvular [rhotic] was a first step to liberate the tongue.”

1.2 CHALLENGES TO TRADITIONAL ACCOUNTS OF FRENCH RHOTIC SHIFT.

Other evidence presents a challenge to these traditional assumptions. Dialectal data suggest that nonapical rhotics, specifically dorsal varieties, were well established within Northern French dialects prior to and during the 17th century (Straka 1965:583-585). Additional support for rhotic variation is seen at an earlier date in the 14th century writing of Jean de Joinville. This suggests the presence of a pharyngeal or rasped /r/ variant during the 14th century, which may be assumed to be dorsal, likely uvular or uvulo-velar (Giauque 1976:41). An

¹ A great deal of simplification is implied in the choice of these three forms: the original apical rhotic, which was likely both tapped and flapped, and the dorsal rhotic [ʁ], [x], or [ʁ] (Straka 1965, Wollock 1982). Also note that throughout this paper I follow the convention of French linguists by using the IPA symbol ʁ in reference to a velar or uvulo-velar, voiced or voiceless fricative or approximant (Tranel 1987).

even more persistent fact that must be taken into account is the continued presence of nonstandard rhotics in French well after the 17th century (Straka 1965).

A second type of rhotic variation is well attested during the 15th and 16th centuries, where the apical rhotic existed alongside not a dorsal articulation, but [z], [s] and in extremely affected speech [ʀ], most often in intervocalic environments (Rosset 1911:296, 300-305). Such variants were also characteristic of the affected speech of the *préciseuses*—women of means concerned with courtesan mannerisms. There is also evidence to suggest that rhotics were continually supplanted with [ʀ] during the 17th century, when upper class women preferred pronunciations such as ‘Touls’ to the standard ‘Tours’ (Wollock 1982:196-197).

While it is clear that the erudite and socially ascendant circles adopted the dorsal rhotic as their own during the 17th century and that apical [r] became associated with lower class speech, it is likely that both dorsal and apical variants were present prior to and after the 17th century. At the same time, other continuants, specifically [ʀ] and [z], were used in the place of [r] or [ʀ]. The story thus unfolds of a complex dynamic in which the formerly favored rhotic was supplanted by [ʀ] after a period of phonological instability. The present work focuses on two questions regarding this shift. First, what phonological factors allowed for such diversity, both articulatory and acoustic, among /r/ variants? Second, how might the coexistence of multiple variants and the eventual selection of the dorsal rhotic over all others (i.e., the path or trajectory of this instance of sound shift) be described and explained?

2. RELATIONAL PHONOLOGY (RP).

My reexamination of French rhotic shift is based on RP, a working theory of sounds whose foundation is the interaction of phonological representations within organic or natural language systems. While not directly opposed to more traditional approaches, RP represents a clear departure from earlier phonological approaches and merits explicit, albeit brief, attention prior to its application to the questions at hand.

Two recent developments in phonological theory are of particular interest to this work, as they serve as bases for the working theory discussed here. The functional phonology of Boersma (1998) makes important strides in the reconciliation of phonetic factors with phonological theory and provides a model for the incorporation of phonetic principles within phonological grammars. Fundamental to this paper are Boersma’s challenge to traditional feature theory and his argument that phonological features are not universal, but are rather emergent properties of the interaction of the two linguistic drives fundamental to speech, articulation and perception. From a functionalist point of view, segmental feature values are language specific and follow from constraint coordination and categorization (Boersma 1998:172). These are interleaved, or simultaneously articulatory and perceptual, although each drive involves a distinct grammar. The Dispersion Theory (DT) of Flemming (1995), elaborated in Padgett (MS) and Ní Chiosáin & Padgett (2001), provides an essentially perceptual approach to the composition of phonological inventories and to processes such as assimilation and dissimilation. Underlying DT is the recommendation that well-formedness be considered within the larger system of contrasts and that speech signals (and therefore optimal phonological outputs) must meet criteria of minimal discriminability (Lindblom 1986, 1990). The foundational RP considerations of segmental interaction owe much to the DT system of contrasts and neutralizations.

Relational Phonology represents a development in functional phonological theory, where it is specifically applied to the description and evaluation of phonological inventories or, to use the preferred term, systems (Russell Webb 2002). This working theory states that a phonological segment may be defined according to the relations of similarity and distinctness implied by its inclusion within an organic linguistic system, i.e., what makes a segment similar to and different from all other segments with which it might be confused or by which it can be substituted in meaning-based paradigmatic relation. Mirroring Boersma's functional phonology, RP considers segments as the product of both articulatory and perceptual relations. A single segment is a dual phonological representation, one aspect of which is productive and the other receptive. Rather than a bundle of universal features (as in traditional feature theory), an RP segment is conceived of as a bundle of relations. From the distinct, interleaved articulatory and perceptual, relational grammars of sound systems, the definition of a given phonological segment emerges from its relations of similarity and distinctness with regard to homorganic segments. Relational Phonology is essentially a synthesis of Functional Phonology and of DT: it shares with the former separate but coordinated articulatory and perceptual drives, as well as the assumption that features are organic and emergent; and it reflects the latter's systemic bias and primacy of systemic contrast and neutralization. All three theories assume that constraints must derive from independent phonetically motivated principles applicable to speech production and processing.

2.1. MODELING ARTICULATORY AND PERCEPTUAL RELATIONS.

Underlying the segmental definition of RP is the phonetic motivation of phonological form. In Russell Webb (2002), this comprises a close description of the gestures used in segment production and the resultant acoustic data. Like other phonological approaches seeking greater phonetic grounding, RP is confronted with a range of variation. Any attempt to provide a phonological grammar whose foundation is phonetic reality must promote those productive and receptive properties that are involved in the distinction of one segment from other homorganic segments, when that distinction can affect meaning, and ignore those that are of little functional importance. In essence, RP must differentiate between what is and is not important in phonetics and systematize the gestural and acoustic properties of sound segments in a manner that reflects presumed phonological representations.

2.2.1 RELATIONAL DESCRIPTION OF 17TH CENTURY FRENCH CONTINUANT SYSTEM.

This analysis of French rhotic shift begins with relational definitions of the original form ([r]) and of the innovative forms ([ʀ], [l], and [z]). For the purposes of discussion here, the phonetic properties of the apical rhotic are adduced from data in languages genetically related to French, specifically Catalan (Recasens 1991; Recasens and Pallarès 1999), Italian (Ladefoged and Maddieson 1996:219-221), and Spanish (Lindau 1985). While this synthesis of linguistic data is less than ideal, inclusion is justifiable based on historical evidence of apical and dorsal rhotic coalescence.

Table 1 provides a description of the articulatory properties of the 17th century French continuant system. Applied to a relational model of the articulatory system, inclusion of an [r] implies greater complexity for the articulator parameter.² There is no means to distinguish

² Distinction between tap and flap apicals is irrelevant for this analysis

between [r] and [l] without the addition of articulator complexity, specifically separate tongue body and tongue apex properties.

segment	articulator	target	contour
ʁ	tongue body	velum	neutral
r	tongue apex	alveoli	neutral
ʒ	tongue body	palate	neutral
z	tongue body	alveoli	grooved
l	tongue body	alveoli	neutral
v	lips	incisors	

TABLE 1: ARTICULATORY PROPERTIES WITHIN THE 17TH CENTURY FRENCH CONTINUANT SYSTEM.

Assuming original apical [r] of French was similar to that described by Lindau (1985), Table 2 provides a picture of the relevant perceptual properties. As above, the perceptual characteristics of apical [r] must be reconstructed using evidence from languages related to modern French. Like [l], apical rhotics display relatively clear, vowel-like formants at approximately 500 Hz, 1000-1600 Hz, and 2100-3200 Hz (Russell Webb 2002: 111-114).

segment	acoustic quantities (in Hz)	acoustic qualities
ʁ	500-950, 1250-1800, 2800-3400	dispersion & formants
r	±500, 1000-1600, 2100-3200	formants
ʒ	2600-3100, 3700-4300, 6100-6400	dispersion & formants
z	4500-5500, 6100-6500, 7300-8000	dispersion & formants
l	325-450, 1500-2500, 3000-4000	formants
v	5000-8000	dispersion

TABLE 2: PERCEPTUAL PROPERTIES WITHIN THE 17TH CENTURY FRENCH CONTINUANT SYSTEM.

Relational Phonology is an inherently systemic view of sound segments, where what is and is not a sound is understood to be as much a product of its positive and negative interaction within an organic system as it is the product of emergent, specified properties. Figures 1 and 2 provide visual models of these properties, i.e., the categorization of systemic differences and similarities between sounds, which are equally important to the segmental definition as are the internal properties of specific sounds.

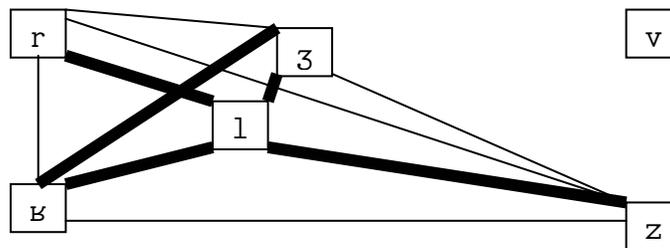


FIGURE 1: MODELED ARTICULATORY RELATIONS IN THE 17TH CENTURY FRENCH CONTINUANT SYSTEM.

The articulatory model depicts positive relations with lines between homorganic segments. Segments sharing maximally positive articulatory relations, i.e., two shared properties, are joined by a thick line; those sharing minimally positive relations, or one positive relation, are joined by a thin line. [v] shares no articulatory properties with other continuants.

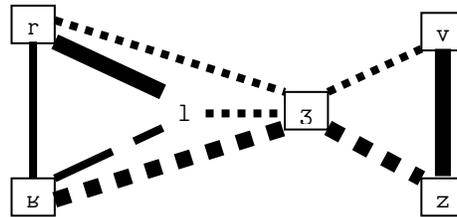


FIGURE 2: MODELED PERCEPTUAL RELATIONS IN THE 17TH CENTURY FRENCH CONTINUANT SYSTEM.

Perceptual relations depicted in Figure 2 are similar to those in Figure 1. Here, segments in maximally positive quantitative relation (identical or overlapping acoustic properties) are represented by a solid line; those in relatively more positive quantitative relation (two shared quantities) are depicted with large dashes; and those in minimally positive (one shared quantity) are depicted with short dashes. The weight of lines represents quality in this visual model: identical or maximally positively related qualities are represented by a heavy line or dash, similar or minimally positively related qualities are represented by a thin line or dash. Absolute negative relations, those implied by segments having no positive relations (either entirely quantitatively and/or qualitatively distinct), are represented in this model by the absence of a line.

A somewhat opaque relational dynamic emerges from the perceptual grammar of French during the 17th century. An important observation is made regarding rhotic similarity to and distinction from [l]. [r] is both quantitatively and qualitatively similar to [l], the most significant difference being the former segment's relatively lower F3. [ʁ] on the other hand is somewhat more distinct, primarily due to the quality of acoustic information available. Each segment is relatively focalized within the perceptual system, however, owing to shared properties with other continuant consonants.

3. THE CONTEXT AND TRAJECTORY OF RHOTIC SHIFT: AN ADAPTIONIST ACCOUNT.

Analysis of rhotic shift and of the systemic limitations placed on phonological innovation follows the adaptionist approach outlined in Lindblom et al. (1995). This model of sound change is founded on the duality of speech communication—the distinction between production and perception—and posits two distinct perceptual modes. The “what mode” is oriented towards the communicated message and is the default mode of perception. The “how mode” is oriented to the signal, i.e., towards the manner by which the message is being communicated, and is proposed as the genesis of phonological innovation. Within the model proposed by Lindblom et al., normal speech produces a potentially infinite, but systemically constrained set of variants. In a perceptual “what” mode or content orientation, listeners repair the communicated message and variation is without effect. When perception occurs in a signal orientation, that is when how something is being said is of more importance than what is being said, listeners do not make a

repair but replicate the innovative form. This first stage or initiation of sound change results in redefined phonetic forms, each of which is evaluated according to articulatory, perceptual, social, and systemic factors. Only those innovations which respect all factors are selected, i.e., result in new pronunciations and lasting sound change (1995:15-16).

Applied to the French rhotic shift, this adaptationist model allows the integration of relational grammars in a description and explanation of this shift's trajectory, the process of adaptation and evaluation during a relatively short period of time, including temporary or unsuccessful targets of sound shift. In a first stage, production of the lexically specified rhotic resulted in variation. Assuming a signal orientation and the presence of both apical and dorsal rhotics during this time, it is hardly surprising that both apical and dorsal rhotics would surface as manifestations of an underlying rhotic. For a sound change to be successful in the long term, however, it must be harmoniously integrated into the language at all levels of evaluation. The articulatory and perceptual evaluative criteria reflect intrinsic components of RP, which states that a phonological segment is the product of an actor within systems defined by relations of distinction and similarity. The systemic or extraphonological and social criteria are outside phonological grammars, but play a crucial role in the outcome of sound change, as discussed below.

3.1 PHONOLOGICAL EVALUATION.

Formalization of the interaction of categorized properties and emergent, systemic relations can be integrated within an Optimality Theory (OT) framework using correspondence constraints. Stated in the most general terms, correspondence refers to the relationship between input and output. Use of correspondence constraints here differs slightly from the original work of McCarthy and Prince (1995). Distinction is made between articulatory and perceptual pairs, as well as between intrinsic correspondence (segmental input-to-output correspondence owing to the gestural or acoustic properties of the segment itself) and relational correspondence (correspondence borne by systemic relations). Assuming the apical rhotic /r/ as the input form, I account for the trajectory of change using four constraints, as follows:

- 1) IDENT IO (ART): All articulatory properties of the input have an output correspondent
- 2) MAX REL IO (ART): All articulatory relations represented in the input have an output correspondent
- 3) IDENT IO (PERC): All perceptual properties of the input have an output correspondent
- 4) DEP REL IO (PERC): All perceptual relations represented in the output have an input correspondent.

IDENT IO constraints penalize articulatory and perceptual output forms whose respective properties do not correspond to those of the input. These are classic faithfulness constraints, promoting identical input-to-output correspondence with regard to the properties of sound segments. MAX REL IO (ART) and DEP REL IO (PERC) are different and focus exclusively on relations, rather than on properties, within the system. These look to the articulatory and perceptual place or space of certain sounds and penalize differential input-to-output relations. The former promote the maximization of input relations in output, while the latter promote the dependence of output relations on those specified in the input. Constraint interaction, specific to

each of the phonological grammars, is provided in Tables 3 and 4.³ With regard to identity correspondence, all innovative candidates present at least one violation and most are equally problematic. Interaction of IDENT IO (ART) and MAX REL IO (ART) suggests that /v/ is the worst articulatory output candidate.

/r/	MAX REL IO (ART)	IDENT IO (ART)
r		
ʁ	*	**
l	***	*
z		**
ʒ	*	**
⦿ [⊗] v	****(!)	**

TABLE 3: CORRESPONDENCE IN ARTICULATORY OUTPUT.

All innovative candidates present at least one violation of perceptual identity correspondence; [l] results in only one violation, whereas [ʁ], [z], [ʒ], and [v] present three. Likewise, these outputs result in at least one violation of the dependency constraint. The segment [ʒ] presents four violations of relational dependency output-to-input correspondence and is eliminated.

/r/	DEP REL IO (PERC)	IDENT IO (PERC)
r		
ʁ	**	***
l	**	*
z	**	***
⦿ [⊗] ʒ	****(!)	***
v	*	***

TABLE 4: CORRESPONDENCE IN PERCEPTUAL OUTPUT.

The relational picture shown above also hints at why [r] and [ʁ]—quite dissimilar on the surface—should be so freely interchangeable. The segments [r] and [ʁ] occupy distinct yet relationally parallel places within the articulatory and perceptual grammars of 17th century French. The segments [z] and [l] are intermediate within the fluctuating dynamic of the system in question, although the relation of [l] to both rhotics is substantially closer than that of [z]. The segments [ʒ] and [v], on the other hand, do not share such close articulatory or perceptual relations with [r] or [ʁ] and are unlikely to be successful candidates.

³ The reader will note that this is a nontraditional application of OT to the process of adaptive evaluation, eliminating the worst, rather than selecting the best output candidate.

3.2 EXTRAPHONOLOGICAL EVALUATION.

A second evaluative stage involving systemic and social criteria explains why [z] and [l] were eventually eliminated as viable rhotic variants and suggests how dorsal [ʁ] eventually supplanted apical [r]. The first of these for the question at hand is the systemic criterion of meaning.⁴ Sound segments must respond not only to requirements of discriminability and articulatory ease, but to the functional need to convey meaning effectively while avoiding confusion in the context of words and utterances (Lindblom et al. 1995:7-8, 17; Lindblom 1990:419-420). Both apical and dorsal rhotics satisfy the systemic criterion while presenting no systemic problems within either the articulatory or perceptual grammars of French. To cite just one example, perceptual confusion of the signified ‘rit’ (‘laugh’) is unlikely to result if this is produced as either [ri] or [ʁi]. Production of /ri/ as [zi] (‘the letter Z’) or [li] (‘bed’ or ‘read’) would, however, result in confusion in a perceptual “what mode” or message orientation. Formalization of systemic considerations is captured in the (admittedly simplistic) constraint *CONFUSE, “Do not allow confusion between lexical outputs,” provided in Table 5.

/ri/	*CONFUSE
ri	
ʁi	
● [*] li	*(!)
● [*] zi	*(!)

TABLE 5: SYSTEMIC OUTPUT EVALUATION.

Within the adaptionist model, social factors are equal components of evaluation. Issues raised by Lindblom et al. include group solidarity and individual identity within a larger community. Assuming a potential variant satisfies articulatory, perceptual, and systemic criteria, it must also respond to a need for social fitness, i.e., a perceived social value (1995:28). Historical evidence suggests that dorsal [ʁ] became closely associated with the upper class and that apical rhotics gained a negative connotation (Rosset 1911; Wollock 1982). Stated rather simply, the association of [ʁ] with the higher classes and the implicit solidarity or aspiration of a significant portion of the population to higher social status provides the final evaluative criterion and supports the elimination of apical [r] from the candidate set.

4. CONCLUSION.

This analysis of rhotic shift in French uses the theory of Relational Phonology to describe the dynamic underlying the shift from apical [r] to dorsal [ʁ] and to explain the systemic tolerances for and trajectory of the phenomenon. Fundamental to this analysis is the historically supported assumption that both rhotics were present within the linguistic community. Relationally defined articulatory and perceptual grammars provide a model by which the systemic ramifications of sound shift can be considered and explain how [r] and [ʁ] could be

⁴ Lindblom and his colleagues use the term differently than I, reflecting the larger, phonologically external system of meanings.

interchanged without effect on the phonological grammar of French, while hinting at the phonological naturalness of other manifestations of the rhotic, specifically [z] and [ʀ]. Using an adaptationist model, relational considerations are integrated within an adaptive evaluation process, suggesting that the path of change was framed or limited by phonological and systemic mechanisms, while the ultimate outcome of this process was determined by social factors.

REFERENCES

- Boersma, Paul. 2000. The odds of eternal optimization in OT. Rutgers Optimality Archives (<http://roa.rutgers.edu>) 429-1200.
- Boersma, Paul. 1998. *Functional phonology: formalizing the interactions between articulatory and perceptual drives*. The Hague: Holland Academic Graphics.
- Boersma, Paul. 1997. Sound change in functional phonology. Rutgers Optimality Archives (<http://roa.rutgers.edu>) 237-1297.
- Delattre, Pierre. 1966. *Studies in French & Comparative Phonetics*. The Hague: Mouton de Gruyter.
- Flemming, Edward. 1995. *Auditory Representations in Phonology*. Ph.D. Dissertation, UCLA.
- Giauque, Gerald S. 1976. An Early Example of Uvular r. *Semasia: Beiträge zur Germanische-Romanische Sprachforschung* 3. 39-45.
- Ladefoged, Peter and Ian Maddieson. 1996. *The Sounds of the World's Languages*. London: Blackwell.
- Lancaster, H. Carrington. 1934. The Beginnings of French Uvular R. *Modern Language Notes* 49. 243-248.
- Lindau, Mona. 1985. The Story of /r/. *Phonetic Linguistics: Essays in honor of Peter Ladefoged*, ed. by Victoria A. Fromkin, 157-168. Orlando: Academic Press.
- Lindblom, Bjorn. 1990. Explaining phonetic variation: A sketch of the H&H theory. *Speech Production and Speech Modeling*, ed. by W. J. Hardcastle and A. Marchal, 403-439. Dordrecht: Kluwer.
- Lindblom, Bjorn. 1986. Phonetic Universals in Vowel Systems. *Experimental Phonology*, ed. by J.J. Ohala and J.J. Jaeger, 13-44. Orlando: Academic Press.
- Lindblom, Bjorn et al. 1995. Is sound change adaptive? *Rivista di Linguistica*, 7(1). 5-37.
- Martinet, André. 1965. *Economie des changements phonétiques: traité de phonologie diachronique*. Berne: Francke.
- McCarthy, John and Alan Prince. 1995. Faithfulness and reduplicative identity. *Papers in Optimality Theory, University of Massachusetts Occasional Papers in Linguistics 18*, ed. by Jill Beckman, Laura Walsh Dickey and Suzanne Urbanczyk, 249-384. Amherst, Massachusetts: GSLA.
- Ní Chiosáin, Máire and Jaye Padgett. 2001. Markedness, Segment Realization, and Locality in Spreading. *Segmental phonology in Optimality Theory*, ed. by Linda Lombardi, 118-156. Cambridge: Cambridge University Press.
- Padgett, Jaye. The Emergence of Contrastive Palatalization in Russian. MS, <http://ling.ucsc.edu/~padgett>.
- Recasens, Daniel. 1991. On the production characteristics of apicoalveolar taps and trills. *Journal of Phonetics* 19. 267-280.

- Recasens, Daniel and Maria Dolors Pallarès. 1999. A study of /r/ and /r/ in the light of the 'DAC' coarticulation model. *Journal of Phonetics* 27. 143-169.
- Rosset, Théodore. 1911. *Les origines de la prononciation moderne étudiées au XVIIe siècle d'après les remarques des grammairiens et les textes en patois de la banlieue parisienne*. Paris: Armand Collin.
- Runge, Richard M. 1974. *Proto-Germanic /r/: The Pronunciation of /r/ Throughout the History of the Germanic Languages*. Göppingen: Alfred Kümmerle.
- Russell Webb, Eric. 2002. *The Relational /r/: Three Case Studies in Rhotic Integrity and Variation*. Ph.D. Dissertation, University of Texas at Austin.
- Straka, Georges. 1965. Contribution à l'histoire de la consonne R en français. *Neuphilologische Mitteilungen* 66(3). 572-606.
- Tranel, Bernard. 1987. *The sounds of French*. Cambridge: Cambridge University Press.
- Wollock, Jeffrey. 1982. Views on the Decline of Apical R in Europe: Historical Study. *Folia Linguistica Historica* 3(2). 185-238.

FRENCH ASPIRATE-h ISN'T ASPIRATE, ISN'T <h>, AND ISN'T FRENCH

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1. INTRODUCTION.

Aspirate-h refers traditionally to the conduct of a set of words in (Standard) French that condition a special type of phonological and morphological behaviour. Examples of such words, paired with non-aspirate examples, include the following (1a-e).

(1) a. Nouns (masc.)

Aspirate-h

<i>haddock</i>	‘haddock’
<i>hameau</i>	‘hamlet’
<i>hangar</i>	‘shed’
<i>haricot</i>	‘bean’
<i>harnais</i>	‘harness’
<i>hasard</i>	‘luck’
<i>havre</i>	‘haven’
<i>héraut</i>	‘herald’
<i>héros</i>	‘hero’
<i>hibou</i>	‘owl’
<i>hippie</i>	‘hippie’
<i>Hitler</i>	‘Hitler’
<i>homard</i>	‘lobster’
<i>hockey</i>	‘hockey’

Non-aspirate-h

<i>habit</i>	‘clothes’
<i>haltère</i>	‘dumbell’
<i>hameçon</i>	‘fish hook’
<i>héctare</i>	‘hectare’
<i>hémisphère</i>	‘hemisphere’
<i>héraldiste</i>	‘heraldist’
<i>héroïsme</i>	‘heroism’
<i>hippopotame</i>	‘hippopotamus’
<i>hiver</i>	‘winter’
<i>homme</i>	‘man’
<i>horizon</i>	‘horizon’

b. Nouns (fem.)

Aspirate-h

<i>hache</i>	‘axe’
<i>haie</i>	‘hedge’
<i>haine</i>	‘hatred’
<i>hâte</i>	‘haste’
<i>hanche</i>	‘hip’
<i>harangue</i>	‘harangue’
<i>hernie</i>	‘hernia’
<i>H.L.M.</i>	‘public housing’ (also masc.)
<i>Hollande</i>	‘Holland’
<i>honte</i>	‘disgrace’
<i>housse</i>	‘cover’

Non-aspirate-h

<i>haleine</i>	‘breath’
<i>harmonie</i>	‘harmony’
<i>hélice</i>	‘propeller’
<i>herbe</i>	‘grass’
<i>hérésie</i>	‘heresy’
<i>héroïne</i>	‘heroine’ (also <i>héro</i>)
<i>heure</i>	‘hour’
<i>hirondelle</i>	‘swallow’
<i>histoire</i>	‘history’
<i>hôpital</i>	‘hospital’
<i>horreur</i>	‘horror’

c.	Verbs			
	<u>Aspirate-h</u>		<u>Non-aspirate-h</u>	
	<i>haïr</i>	‘to hate’	<i>habiller</i>	‘to dress’
	<i>hâler</i>	‘to haul in’	<i>habituier</i>	‘to get used to’
	<i>hanter</i>	‘to haunt’	<i>halluciner</i>	‘to hallucinate’
	<i>harceler</i>	‘to harass’	<i>héberger</i>	‘to lodge’
	<i>hausser</i>	‘to raise’	<i>hériter</i>	‘to inherit’
	<i>hennir</i>	‘to neigh’	<i>hésiter</i>	‘to hesitate’
	<i>hérissier</i>	‘to bristle’	<i>honorer</i>	‘to honour’
	<i>heurter</i>	‘to strike’	<i>horripiler</i>	‘to exasperate’
	<i>honnir</i>	‘to hold in contempt’	<i>humilier</i>	‘to humiliate’
	<i>hurler</i>	‘to scream’	<i>hypnotiser</i>	‘to hypnotise’
d.	Adjectives			
	<u>Aspirate-h</u>		<u>Non-aspirate-h</u>	
	<i>hâbleur</i>	‘boastful’	<i>habile</i>	‘skilful’
	<i>hagard</i>	‘wild’	<i>habituel</i>	‘habitual’
	<i>haineux</i>	‘malevolent’	<i>hébreu</i>	‘Hebrew’
	<i>handicapé</i>	‘handicapped’	<i>héréditaire</i>	‘hereditary’
	<i>hardi</i>	‘bold’	<i>heureux</i>	‘happy’
	<i>hâtif</i>	‘hasty’	<i>hitlérien</i>	‘Hitlerian’
	<i>haut</i>	‘high’	<i>homogène</i>	‘homogenous’
	<i>hideux</i>	‘hideous’	<i>honnête</i>	‘honest’
	<i>hollandais</i>	‘Dutch’	<i>humble</i>	‘humble’
e.	Other			
	<u>Aspirate-h</u>		<u>Non-aspirate-h</u>	
	<i>hormis</i>	‘except’	<i>hélas</i>	‘alas’
	<i>hors</i>	‘outside’	<i>hier</i>	‘yesterday’

French contains well over 600 aspirate-h words (including numerous derived forms, e.g., *hivernal* ‘wintry’, *hâtif* ‘hasty’, *harengère* ‘fishwife’, *harcelement* ‘harassment’, *harnachement* ‘harnessing’, *hasardeux* ‘hazardous’ and so on, but excluding proper nouns).

2. STANDARD BEHAVIOUR OF ASPIRATE-h WORDS.

While the aspirate-h words are morphologically and syntactically fully regular, they are phonologically anomalous. The anomaly resides in the fact that, although they are phonetically vowel-initial, they act, with respect to a number of phonological processes in French, as if they began with a consonant. This consonant-initial behaviour, including that involved in "aspiration," is said to condition the absence of elision (λ , a \rightarrow \emptyset / __V, e.g., *l'ami* ‘the friend’, *l'église* ‘the church’ < *le ami*, *la église*); the absence of *enchaînement* (linking) or resyllabification (VC.V \rightarrow V.CV, e.g., *pour aller* ‘in order to go’ /puʁ.a.le/ \rightarrow /pu.ʁa.le/); the absence of liaison ($\emptyset \rightarrow$ C / __V, e.g., *les jeunes* ‘the young’ /le.ʒœn/ versus *les arbres* ‘the trees’ /le.zaʁbʁ/) and the selection of pre-consonantal allomorphs for a limited set of forms (*au* ‘to the’, *du* ‘of the’, *beau* ‘handsome’, *ce* ‘this’, *vieux* ‘old’, *nouveau* ‘new’, *ma* ‘my’, *ta* ‘your’,

sa ‘his, her’ /__C; *à l’, de l’, bel, cet, vieil, nouvel, mon, ton, son* /__V).¹ In short, aspirate-h words are phonetically vowel-initial but behave in the opposite manner, as if they were consonant-initial. Representative examples of such consonant-initial behaviour are seen in (2):

(2)	<u>#Aspirate-h</u>		<u>#Non-aspirate-h</u>	
a. elision in <i>le, la</i>	<i>le héros</i>	‘the hero’	<i>l’homme</i>	‘the man’
	/lɛ.ɛʁo/		/lɔ̃m/	
	<i>la housse</i>	‘the cover’	<i>l’heure</i>	‘the hour’
	/la.us/		/lœʁ/	
b. elision of schwa	<i>quelle haine</i>	‘what hatred’	<i>quelle honneur</i>	‘what an honour’
	/kɛlɛ.ɛn/		/kɛ.lɔ̃nœʁ/	
	<i>quatre héros</i>	‘4 heros’	<i>quatre héroïnes</i>	‘4 heroines’
	/katʁɛ.ɛʁo/		/ka.tʁœɔ̃in/	
c. <i>enchaînement</i>	<i>sept hêtres</i>	‘7 beeches’	<i>sept hôtes</i>	‘7 hosts’
	/sɛt.ɛtʁ/		/sɛ.tot/	
d. liaison	<i>dix hérauts</i>	‘ten heralds’	<i>dix hommes</i>	‘ten men’
	/di.ɛʁo/		/di.zɔ̃m/	
	<i>nous haïssons</i>	‘we hate’	<i>nous honorons</i>	‘we honour’
	/nu.aisɥ̃/		/nu.zɔ̃nɔ̃ʁɔ̃/	
e. special forms	<i>beau heaume</i>	‘nice helmet’	<i>bel hôtel</i>	‘nice hotel’
	/bo.om/		/bɛ .lotɛl/	
	<i>ce haut</i>	‘this top’	<i>cet hôtel</i>	‘this hotel’
	/sɛ .o/		/sɛ .totɛl/	
	<i>du haut</i>	‘of the top’	<i>de l’hôtel</i>	‘of the hotel’
	/dy.o/		/dɛlotɛl/	
	<i>vieux huche</i>	‘old chest’	<i>vieil homme</i>	‘old man’
	/vjø.yʃ/		/vjɛ .jɔ̃m/	
	<i>ma hache</i> (fem.)	‘my ax’	<i>mon herbe</i> (fem.)	‘my grass’
	/ma.aʃ/		/mɔ̃ .nɛʁb/	

These data represent the standard view of aspiration in French, and provide a starting point for the discussion of the special properties of this class of words and the variable behaviour many of them manifest under certain conditions. We may first consider the use of the term “aspiration” itself.

¹A further somewhat arcane effect of aspiration involves the behaviour of the normally invariable adverb *tout* ‘all, very’, which agrees with a following feminine adjective beginning with a consonant or an aspirate-h: *il est tout petit* ‘he’s very small’, *ils sont tout petits* ‘they’re very small’, *elle est tout habile* ‘she’s very skillful’, *elles sont toutes habiles* ‘they’re very skillful’; but *elle est toute petite* ‘she’s very small’, *elles sont toutes petites* ‘they’re very small’, *elle est toute haineuse* ‘she’s very malevolent’, *elles sont toutes hâbleuses* ‘they’re very boastful’.

3. ASPIRATE-h ISN'T ASPIRATED.

In Standard French, unlike certain other varieties (including examples drawn from Canadian French), there is no phonetic realization of the letter <h>. As a result, pairs of words like *eau* 'water' – *haut* 'top', *aine* 'groin' – *haine* 'hatred', *auteur* 'author' – *hauteur* 'height', *air* 'air' – *hère* 'wretch', *être* 'being' – *hêtre* 'beech tree', *heure* 'hour' – *heurt* 'blow', *île* 'island' – *hile* 'hilum' are pronounced identically when in isolation. The occasional occurrence of glottal stop that may be heard is stylistically highly marked and not uniformly correlated with <h>. (Glottal stop is much more frequent in so-called *liaison sans enchaînement*² contexts [Encrevé 1988]: *je ne l'avais pas entendu* 'I hadn't heard it' /ʒɛ̃nlavɛpaz.ʔãtãdy/.) Further, the infrequent phonetic [h] that occurs is limited to a small number of exclamations (*hein, hem, hi, hip, ho*: [hɛ̃ ~ ʔɛ̃ ~ ɛ̃]), etc., and is always potentially absent. Finally, French has a high tolerance for vocalic hiatus, a tolerance that also contributes to the absence of a requirement for any direct phonetic realization of <h>. In light of the above, use of the term 'aspirate' to characterize the current pronunciation of these forms is misleading.

4. OTHER TYPES OF "ASPIRATION."

So-called "aspiration" isn't restricted to <h>. The type of behaviour where apparently identical segments behave differentially, one as a consonant, the other as a vowel, or where vowel-initial words fail to undergo processes typical of vowel-initial forms, is widespread in French. Words beginning with glides, for example, parallel aspirate-h words in several ways, showing differential behaviour with respect to elision and liaison, as seen in (3):

- (3) "Aspirate" versus "non-aspirate" glides
- a. consonantal glides
- | | | |
|--------------------|-------------|-----------------|
| <i>il le jodle</i> | /illʎjɔdl/ | 'He yodels it.' |
| <i>le yaourt</i> | /lʎjauʁ/ | 'the yogurt' |
| <i>le yoga</i> | /lʎjɔga/ | 'the yoga' |
| <i>le ouistiti</i> | /lʎwistiti/ | 'the marmoset' |
| <i>le western</i> | /lʎwestɛʁn/ | 'the western' |
- b. vocalic glides
- | | | |
|-----------------|---------|--------------|
| <i>l'iode</i> | /ljɔd/ | 'the iodine' |
| <i>les yeux</i> | /lezjø/ | 'the eyes' |
| <i>l'yeuse</i> | /ljøz/ | 'the oak' |
| <i>l'ouest</i> | /lwest/ | 'the west' |
| <i>l'ouïe</i> | /lwi/ | 'hearing' |

Consider, for example, the words *ouest* and *western*. Both begin phonetically with the glide [w], yet the first requires elision in the definite article *le*, while the second blocks it. Thus, in (3) we see sets of words where the diagnostic tests of (2) that are sensitive to the distinction

² *Liaison sans enchaînement* refers to the realization of a normally silent final linking consonant without that consonant being resyllabified to the beginning of the following vowel-initial word.

between vowels and consonants distinguish systematically between (3a) and (3b), despite the identical initial segments [j] and [w].

In addition, proper names, the names of several numbers, certain initialisms, and the occasional rare word, despite being phonetically vowel-initial, also block liaison and elision or require preconsonantal allomorphs as shown in (4):

- (4) a. *sans elle* /sãzɛl/ ‘without her’, *sans arriver* /sãzaʁive/ ‘without arriving’ versus *sans Eve* /sãɛv/ ‘without Eve’; *chez elle* /ʃezɛl/ ‘at her place’ versus *chez Odile* /ʃɛɔdi l/ ‘at Odile’s’; *deux opéras* /døzɔpɛʁa/ ‘two operas’ versus *deux Opéras* /døpɛʁa/ ‘two tickets to the Opéra bus stop’
- b. *le un* /lœ̃/ ‘the one’, *le huitième* /lœ̃tiɛ̃m/ ‘the eighth’, *au onzième* /oɔzjɛ̃m/ ‘on the eleventh’
- c. *le RER* /lœ̃ʁœ̃ʁ/ ‘the RER (regional train network)’, *la RATP* /laʁaʁaʁtɛp/ ‘the RATP (Paris transport authority)’, *les SDF* /lœ̃sɔdɛf/ ‘the homeless (*sans domicile fixe*)’ versus *l’ONU* /lœ̃ny/ ‘the United Nations’, *les ovni* /lœ̃zɔvni/ ‘the UFOs (*objet volant non-identifié*)’³
- d. *le uhlan* /lœ̃ylã/ ‘the uhlan’; *ils ululent* /ilœ̃lyl/ ‘they hoot’ (also *hululent*)

Finally, metalinguistic usage or the citation of linguistic forms also isolates words phonetically, with the result that virtually any vowel-initial item may not link, nor permit the normal vowel deletion, in a way parallel to aspirate-h forms:

(5) Metalinguistic “aspiration”

Les ou /lœ̃. . . / *ont été remplacés par et* /...pʁã. e/. ‘or has been replaced by and.’

Le –ampe de rampe. /lœ̃ãpãdʁãp/ ‘The –ampe in rampe.’

Le Albert /lœ̃albœ̃. . . / *est mal écrit.* ‘The word *Albert* is poorly written.’ versus *L’Albert* /lœ̃albœ̃. . . / *que je connais.* ‘The *Albert* I know.’

Il ne pense qu’à la recherche / . . .kaʁãʁʃœ̃ʃ. . . / *d’un emploi.* ‘He thinks only about looking for a job.’ versus *Le premier chapitre de A la recherche* / . . .dœ̃laʁãʁʃœ̃ʃ. . . / *du temps perdu.* ‘The first chapter of *A la recherche du temps perdu.*’

As we see from the foregoing, it is incorrect to correlate “aspiration” in French exclusively with the letter <h>, since other categories of words where no initial <h> is present manifest the same behaviour. In particular, we find a large number of words with an initial orthographic vowel that behave, at least in restricted contexts, as if they began with a consonant.

³ Note the difference between initialisms, where each letter is pronounced independently and the names of these letters are phonetically vowel-initial, versus acronyms, where the sequence of letters is read as an actual word and that word is phonetically vowel-initial.

5. “ASPIRATION” ISN’T FRENCH.

We have now seen that aspirate-h is not aspirated—there is, in fact, no phonetic realization of the letter involved (nor of its non-aspirate counterpart, for that matter). Furthermore, aspiration behaviour (absence of elision, liaison or *enchaînement*; conditioning of pre-consonantal allomorphs) is not limited to <h>, because certain glide-initial words, proper nouns, initialisms, and other forms act in a similar manner. Finally, we can observe that the core of aspiration behaviour resides in a body of forms that are foreign rather than French (that is to say, Romance) in origin.

The letter <h> has two primary sources in French. The first, the larger and regular stock of Latin words (*homme, herbe, habiller*, and so on, from [1] above), lost the /h/ early; therefore, such words were, in fact, phonetically vowel-initial, hence non-aspirate, when vowel deletion and liaison were established in the Old French period, so that these processes affected the forms in question. The irregular aspirate forms primarily reflect Germanic loans imported after the Frankish conquest, loans that had, at that time, an actual consonantal segment /h/ word-initially that blocked elision and liaison at their formative stages. Needless to say, this /h/ was subsequently dropped, but the consonantal behaviour it conditioned had “frozen” so that we are confronted with an irregular class of words that are vowel-initial phonetically, but consonant-initial in the type of behaviour they condition. Without examining each word in detail, we may note that, etymologically, the great majority of aspirate-h words is of non-latin origin, usually Germanic (primarily Frankish) for earlier forms, English and Arabic for later, as an examination of the lists in (1) indicates. Moreover, for the aspirate glides, their predominantly foreign origin should be evident from the typical examples in (3). We now see how one can affirm, at least with some degree of accuracy (and facetiousness), that French aspirate-h isn't aspirate, isn't <h>, and isn't French.

6. THE VARIABLE COMPLEXITY OF ASPIRATION BEHAVIOUR.

The description of aspiration in (2) represents the standard, prescriptive account of the phenomenon: a limited set of words that is inherently irregular (in that vowel-initial words function as if they begin with a consonant), but that nonetheless behaves consistently with respect to a set of processes sensitive to word-initial consonants (vowel elision, liaison and *enchaînement*, allomorph selection). However, the apparent homogeneity of aspiration with respect to the processes in (2) is far less stable than would first appear.⁴ Given that aspiration behaviour reflects an irregular historical residue, normal processes of change should tend to assimilate aspirate-h words to the regular category showing vowel-initial rather than consonant-initial patterning. This can indeed be observed within the behaviour of French speakers. One can establish a hierarchy of “aspirateness” ranging from virtually total respect of the aspiration properties of (2) for certain conservative speakers (i.e., regular #C behaviour of aspirate-h words), through different types of variability, to total “non-aspirateness” (i.e., regular #V behaviour) for many words or many speakers. Illustrations of this hierarchy of variability follow in (6), gleaned from a review of the literature and from personal observation.

⁴ de Cornulier (1981), from whom I have taken a number of examples, provides by far the most detailed discussion of the complexities of aspiration in French.

- (6) Examples of movement from aspirated (#C) to non-aspirated (#V) status
- a. Forms generally showing stable #C behaviour, including derived forms that remain aspirate: *houille* (fem. N) ‘coal’, *houiller*, *houillère* (adj.) ‘coal-bearing’, *houillère* (fem. N) ‘coalmine’; *hâle* ‘suntan’ or ‘sunburn’, *hâler* ‘to tan’ or ‘to burn’.
 - b. Variability, where, for many speakers, aspirate words (roots) pass into the non-aspirate class in all respects: *haïtien* ‘Haitian’, *hameçon* ‘fish hook’, *harpaille* ‘herd’, *hâtelle* ‘small piece of meat’, *hellène* ‘Hellenic’, *hernie* ‘hernia’, *hernié* ‘herniated’, *hiatus* ‘hiatus’, *hittite* ‘Hittite’, *H.L.M.* ‘subsidized housing’, *hyène* ‘hyena’, *iambe* ‘iamb’, *ouate* ‘cotton wool’, *l’e-muet* or *le e-muet*, *l’h aspiré* or *le h aspiré*, and numerous others (where normative reactions may vary). Proper nouns regularly show this type of variability. In virtually all cases, the direction of change is from aspirate to non-aspirate behaviour, a clear indication of the exceptional status of aspirate-h words.
 - c. Variation where the root is aspirate (or variably aspirate) but derived forms are (or may be) non-aspirate. Aspirate *héraut* ‘herald’, *héros* ‘hero’ and *Hitler* have the exclusively nonaspirate derivatives *héraldique*, *héraldiste*, *héroïne*, *héroïque*, *héroïsme*, and *hitlérien* respectively; *hameçon* ‘fish-hook’ and *Hellène* ‘Hellene’ vary, but *hameçonner* ‘to hook’, *hellénique* ‘Hellenic’, *-isant*, *-isation*, *-iser*, *-isme* and *-iste* are exclusively nonaspirate; *hâte* ‘haste’ has several aspirate derivatives (e.g., *hâtivement* ‘hastily’), but *hâtif* ‘precocious’ varies and may be nonaspirate. Derived forms by definition indicate integration of the root into the morphological system, and one indication of such integration is regularization to non-aspirate status.
 - d. Differential application of the processes of elision, liaison, and resyllabification (with significant individual variation):
 - (i) Liaison in *les haricots* ‘the beans’ /lezaxiko/, *les handicapés* ‘the handicapped’ /lezãdikape/, *les homards* ‘the lobsters’ /lezɥmaʁ/, *ils harcèlent* ‘they harrass’ /ilzaʁsɛl/ and others, but the “errors” in liaison are not paralleled by elision in the articles. **l’haricot*, **l’homard*, etc., have not yet appeared.
 - (ii) Liaison in the plural but not the singular: *un hors-d’oeuvre* /œ̃ɥʁdœvʁ/ versus *des hors-d’oeuvre* /dezɥʁdœvʁ/, or *sa hernie* ‘his hernia’ /saɛʁni/, *un(e) hernie* ‘a hernia’ /yn.ɛʁni/ (with no *enchaînement*) versus *des hernies* ‘hernias’ /de.zɛʁni/.
 - (iii) Deletion of schwa without corresponding resyllabification of the preceding consonant: *le huitième* ‘the eighth’ /lɥɥitjɛm/ but *j’en prends l(e) huitième* ‘I’m taking the eighth.’ /...pʁãl.ɥitjɛm/; *donne-moi une housse* ‘Give me a cover.’ /...yn.us/, *une bonne hache* ‘a good ax’ /ynbɥn.ɑʃ/.
 - (iv) Idiosyncratic behaviour of individual words: *d’hier* or *de hier* ‘of yesterday’ but only *ce hier*, *le hier* ‘this, the yesterday’; *hasard* ‘stroke of luck’ is an aspirate-h word (*le hasard*), but it shows *enchaînement* with

par: *par hazard* ‘by chance’ /pa.ʁazaʁ/ (but perhaps not in *quel hasard* ‘what a stroke of luck’); *le Hollandais* /lɑ̃ɑ̃dɛ/, *un Hollandais* /œ̃ɑ̃dɛ/ ‘the, a Dutchman’ but *une Hollandaise* ‘a Dutchwoman’ /ỹ.nœ̃ɑ̃dɛz/ with schwa deletion and *enchaînement*; *les héros* ‘the heroes’ /lɛɛʁo/ (no liaison) but *un nouvel héros* ‘a new hero’ /œ̃nuvɛ.lɛʁo/ (with the pre-vocalic allomorph and *enchaînement*); *toutes sortes d’héros* ‘all kinds of heroes’ /tutɔʁtɛʁo/ (with elision).

- (v) There are distance effects, with schwa deletion more frequent or more acceptable the further it is removed from phrase-final stress: *trente Hongrois* /tʁɑ̃tɛ̃ŋɡʁwa/ ‘30 Hungarians’ versus *trente Huns* /tʁɑ̃tɛ̃/ ‘30 Huns’; *elle haïssait* /ɛlɑ̃sɛ/ ‘she hated’ versus *elle hait* /ɛlɑ̃/ ‘she hates’; *une pareille hachette* /ynpɑ̃ʁɛjɑʃɛt/ ‘a similar hatchet’ versus *une pareille hache* /ynpɑ̃ʁɛjɑʃ/ ‘a similar ax’, etc. (cf. de Cornulier [1981: 208]).
- (vi) There are frequency or familiarity effects, where words seen as technical retain aspiration more easily, and frequent words or expressions lose it: *hiatus*, which varies, appears more “aspirated” in technical uses; *par hasard*, a frequent expression, freely admits *enchaînement*, and so on.⁵

- e. Recent loan words, largely from English, that are spelled with <h> and that, for many speakers, contain an initial phonetic [h] (*half-track*, *hard*, *hard-top*, *highlander*, *hobby*, *holding*, *home*, and so on) will, no doubt, complicate matters further by reintroducing true aspiration into French, provoking the phonological consequences that follow.

As these data make clear, the behaviour of “aspiration” reflects far less of the regularity and stability that standard descriptions would imply. We may now turn to a consideration of some of the more general implications of this heterogeneity.

7. CONCLUSION.

Despite normative claims that attempt to impose a certain uniformity on the class of aspirate-h words, the entire class is variable, some forms more so than others, depending on the usual factors, sociolinguistic and other, which influence variation. Consequently, a purely phonological solution with a distinct phonological representation for aspirate-h words, whether that representation be linear or non-linear,⁶ is inappropriate because it cannot account for the variation in (6), especially the non-parallel behaviour of many forms with respect to the processes in (2). (How could such a representation accept elision in *de* but not *ce*; *enchaînement* with *par* but not *quel* for *hasard*; liaison in the plural but not the singular; liaison but not elision; and so on?) Hence, “aspiration” is best seen as a lexical property characterizing an irregular class of items including many that do not begin with <h>.

⁵ For a further discussion of this point, see de Cornulier (1981: 204).

⁶ Cf. Schane (1968) or Selkirk and Vergnaud (1973).

As members of a minor lexical class, such words exhibit an entirely normal evolution: they tend to regularize. There is movement from aspirate to non-aspirate, regularity of derived forms when the base is irregular (i.e., when it is arbitrarily marked as [+aspirate]⁷), variation in the base when the derived forms are regular, differential sensitivity to liaison versus elision or to different preceding forms, sensitivity to the frequency of the forms involved or to their perception as learned, and so on. Such irregularity is a normal consequence of the history of the language, especially in the context of a shift from phonological to nonphonological conditioning, and should be incorporated into phonological theory rather than camouflaged via attempts at abstract phonological representations.

Given the data in (6), moreover, “aspiration” cannot simply be viewed as a property of words in isolation—it is clearly sensitive to syntactic effects: sentence-initial versus sentence-internal position, for example, or distance from stress, or the identity of the preceding morpheme. In some ways, the sequences showing such behaviour are reminiscent of the “chunks” of Bybee (2001, especially Chapter 7) because the changes in aspiration behaviour involve sequences larger than words, reinforce the syntactic unity of these sequences, and are sensitive to certain frequency effects. Not even this approach can provide the final answer, however, because whatever chunks are recognized will still show internal variability of the type seen in (6) and will require still further ad hoc specifications to reflect the variable behaviour exemplified above.

At this stage, our knowledge of aspiration in French remains highly fragmentary, based on largely haphazard and unsystematic observations. A full understanding of the orderly heterogeneity involved in the behaviour of aspirate-h words (or of the phonological islands in which they occur) requires a large-scale quantitative sociolinguistic study capable of coping with the relative rarity of aspiration and the syntactic structures with which it interacts. Such a study remains an important task for the future.

REFERENCES

- Bybee, Joan. 2001. *Phonology and Language Use*. Cambridge: Cambridge University Press.
- de Cornulier, Benoit. 1981. H-aspiré et la syllabation. Expressions disjonctives. In: Goyvaerts, D. (ed.), *Phonology in the 1980's*. Ghent: Story-Scientia, 183-230.
- Dell, François. 1973. *Les règles et les sons*. Paris: Hermann.
- Encrevé, Pierre. 1988. *La liaison avec ou sans enchaînement. Phonologie tridimensionnelle et usages du français*. Paris: Seuil.
- Fouche, Pierre. 1959. *Traité de prononciation française*. 2nd edition. Paris: Klincksieck.
- Gaatone, David. 1978. Phonologie abstraite et phonologie concrète. A propos de h aspiré en français. *Linguisticae investigationes* 11, 3-22.
- Klausenburger, Jurgen. 1977. A non-rule of French: h-aspiré. *Linguistics* 192, 45-52.
- Martinet, Andre and Henriette Walter. 1976. *Dictionnaire de la prononciation française dans son usage réel*. Paris: France Expansion.
- Muller, Charles. 1973. Sur l'h aspiré. *Praxis* 4, 418-421.

⁷ In its isolation of forms, so-called “aspiration” overlaps with the citation of linguistic items (metalinguistic usage) and with the phonetic segregation of items via other means (e.g., via *liaison sans enchaînement* [Encrevé 1988]). In fact, the loss of aspiration in the traditional cases (as in 6b-c) is often contradicted by the tendency to isolate words phonetically for emphatic or stylistic purposes, leading to increases in the absence of elision or liaison for aspirate-h and other words.

- Schane, Sanford. 1968. *French Phonology and Morphology*. Cambridge: MIT Press.
- Selkirk, Elisabeth and Jean-Roger Vergnaud. 1973. How abstract is French phonology? *Foundations of Language* 10, 249-254.
- Tranel, Bernard. 1981. *Concreteness in Generative Phonology. Evidence from French*. Berkeley: University of California Press.
- Tranel, Bernard. 1993. Current issues in French phonology: liaison and position theories. In Goldsmith, J., ed. *The Handbook of Phonological Theory*. Oxford: Blackwell, 798-816.
- Tranel, Bernard. 1996. French liaison and elision revisited: A unified account within Optimality Theory. In Parodi, C., C. Quicoli, M. Saltarelli, and M.L. Zubizarreta, eds., *Aspects of Romance Linguistics. Selected Papers from the Linguistic Symposium on Romance Languages XXIV, March 13-14, 1994*. Washington: Georgetown University Press, 433-455.
- Walker, Douglas. 2001. *French Sound Structure*. Calgary: University of Calgary Press.
- Walter, Henriette. 1976. *La dynamique des phonèmes dans le lexique français contemporain*. Paris: France Expansion.
- Warnant, Léon. 1987. *Dictionnaire de la prononciation française dans sa norme actuelle*. Paris-Gembloux: Duculot.

THE PERFECT CORRESPONDENCE BETWEEN GENDER FEATURES AND GENDER FORMS IN ITALIAN

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1. INTRODUCTION.

In the generative literature, the existence of gender morphemes has been challenged for Spanish by Harris (1991a, 1991b, 1996) and for Italian and other Romance languages by Berstein (1993). For Spanish, for instance, it has been claimed that the noun endings <o> and <a> are not gender morphemes expressing respectively, the masculine and the feminine gender feature. Rather, they are simply “word markers, i.e., the phonological signature of arbitrary classes of words” (Harris 1996:104). The assumption that the endings <o> and <a> are not gender morphemes is based on two observations: (i) the presence of a small group of exceptions, i.e., masculine nouns ending in <a> and feminine nouns ending in <o>, and (ii) the cross-categorical nature of the endings <o> and <a>, which are found as the terminal elements on all parts of speech except finite verbs (Harris 1996: 104). These two factors led Harris, among others, to conclude that an arbitrary relationship exists between gender features and gender forms; therefore, the endings <o> and <a> cannot be considered the morphological expression of gender.

In this paper, I challenge Harris’s conclusion, showing that, at least in the case of Italian, a one-to-one correspondence exists between gender forms and gender features. I contend that the endings <o> and <a>, in effect, are gender morphemes and not word markers. It follows, then, that for Italian all nouns ending in <o> are masculine and all nouns ending in <a> are feminine. My analysis is based on a novel interpretation of the so-called exceptions. I demonstrate that the end vocalic segments of the exceptions differ in nature and distribution from the gender morphemes <o> and <a>, and that the exceptions and nouns ending with morphemes <o> and <a> cannot be considered part of the same noun classes. Because the exceptions and nouns ending in <o> and <a> are not similar linguistic objects, it is unprincipled to use the exceptions as an argument in favor of the claim of arbitrariness between gender features and gender forms. Before entering in the core of the analysis, I give a description of the Italian nominal system, focusing on the representation of gender across different nouns classes.

2. ITALIAN GENDER SYSTEM.

In Italian all nouns are marked either for masculine or for feminine gender. Gender is obligatory in Italian for purposes of agreement. Looking at the endings of nouns it is possible to establish five noun types, e.g., nouns ending in <o>, nouns ending in <a>, nouns ending in an epenthetic <e>, recent loans and a residue class of nouns as represented in Table 1.

Type	Gender	Singular	Example	Plural	Example
<o>	Masculine (m)	-o	tavolo 'table'	-i	tavoli 'tables'
<a>	Feminine (f)	-a	casa 'house'	-e	case 'houses'
epenthetic	Masculine (m) Feminine (f)	-e -e	fiore 'flower' parete 'wall'	-i -i	solì 'flowers' pareti 'walls'
Loans	Masculine	0	bar	0	bar 'bars'
Residue	Masculine (m) Feminine (f)	è ì à ù i	caffè 'coffee' città 'city'	0	caffè 'coffees' città 'cities'

TABLE 1: ITALIAN GENDER SYSTEM.

As Table 1 shows, nouns end in <o> if masculine (m) and in <a> if feminine (f); however, there are a small number of exceptions like the examples in (1)a,b: feminine nouns ending in <o> as in (1)a, and masculine nouns ending in <a> as in (1)b.

- (1) a. moto (f) 'motorbike', mano (f) 'hand', metro (f) 'underground'
 b. poema (m) 'poem', sistema (m) 'system', tema (m) 'theme'

The epenthetic, recent loan, and residue types (Table 1) constitute three separate groups of nouns whose gender feature is not expressed through morphemes, but through DP or VP agreement as shown in (2)a,b.

- (2) a. *il sole cald-o*
 the .m sun hot .m
 the hot sun
- b. *il bar nuov-o*
 the .m bar new .m
 the new bar

For epenthetic type nouns, I assume that the end vowel <e> is an epenthetic segment carrying no gender or other relevant information. Its presence is due purely for syllabification reasons. The syllabification of Italian prohibits word-final coda consonants. The only nouns ending in coda consonant are recent loan types (Table 1). The contentless nature of the vowel <e> can be inferred by the fact that the phoneme [e] is subject to deletion when it is preceded by a sonorant consonant (l,r,n, or m). This is the phenomenon of 'TRONCAMENTO'. The elision of this segment, however, does not deprive the noun of its gender information; gender is still retrievable from DP agreement as illustrated in (3).

- (3) a. *il sole levante / il sol levante*
the .m sun raising / the .m sun raising
the rising sun
- b. *la capitale d'Italia / la capital d'Italia*
the .f capital of Italy / the .f capital of Italy
the capital of Italy

It is interesting to note that *troncamento* occurs only in the presence of epenthetic segments. If the final vowel is a morpheme, *troncamento* does not take place as (4) shows.

- (4) *Gianni mostra le suole / *suol rovinate delle sue scarpe* (Nespor 93:227).
Gianni shows the sole .pl worn-out of his shoes
Gianni shows the worn-out soles of his shoes.

In (4), *troncamento* does not take place because the final <e> of the plural feminine noun *suole* 'soles' is a morpheme denoting class and number. Contrary to (3), the elision of <e> in (4) is prohibited because it would have the effect of erasing the number and class information.

All nouns of the recent loan type (Table 1) are not phonologically integrated into Italian. Loans of inanimates take the default masculine gender, whereas loans of nouns denoting human beings undergo semantic gender assignment; i.e., they are feminine if they denote a female person and masculine if they denote a male person.

Finally, nouns in the residue class are few in number and they belong to closed classes of substantives. In general it is possible to establish the gender of these nouns by looking at their final vowel. For instance, most of the nouns ending in <à>, <ù> and <i> are feminine, whereas the majority of nouns ending in <è> and <ì> are masculine as shown in (5).

- | | | |
|--------|---------------|--|
| (5) a. | -à, feminine | la città 'city', la novità 'new' |
| b. | -ù, feminine | la virtù 'virtue', la gioventù 'youth' |
| c. | -i, feminine | la crisi 'crisis', la tesi 'thesis' |
| d. | -è, masculine | il caffè 'coffee' |
| e. | -ì, masculine | il colibrì 'hummingbird' |

It is interesting to note that there are no simple core Italian nouns ending in unstressed <u>, a fact that will be relevant during the discussion in 3.2 relating to the distinct lexical feature of the word *mano* 'hand'.

3. THE NATURE OF <o> AND <a>.

In the next sections, I show that there is no need to postulate the existence of word markers. I demonstrate that the end markers <o> and <a> are morphemes expressing gender features and that the so-called exceptions cannot be used as an argument against the existence of gender morphemes. As the data in 3.1, 3.2 and 3.3 will show, the end vocalic segments of the exceptions differ in nature and distribution from the gender morphemes. If this first premise is correct, it follows that the claim that both animate and inanimate nouns ending in <o> are masculine and those ending in <a> are feminine is also true. Consequently, the claim of

arbitrariness between gender forms and gender features turns out to be false.

3.1 FEMININE NOUNS ENDING IN <o>.

The number of exceptions of feminine nouns ending in <o> is very small, a maximum of ten tokens, and they are of two types: (i) reduced compound forms (6)a-f; and (ii) the isolated case of *mano* 'hand' in (6)g.

- (6)
- a. *metro* < *metropolitana* 'metro'
 - b. *auto* < *automobile* 'car'
 - c. *radio* < *radiofonia* 'radio'
 - d. *dinamo* < *macchina dinamo* 'dynamo'
 - e. *foto* < *fotografia* 'photo'
 - f. *moto* < *motocicletta* 'motorbike'
 - g. *mano* 'hand'

With regard to the exceptions (6)a-f, the gender information of the reduced compound forms is conveyed only through agreement with the gender information encoded in the unpronounced part of the word, which is feminine, as the agreement marker <a> shows in the examples in (7).

- (7)
- a. *la [macchin-a] dinamo ner-a*
the .f [machine- .f] dynamo black-.f
the black dynamo
 - b. *la moto-[ciclett-a] bianc-a*
the .f motor-[cycle-.f] white-.f
the white motorbike

I assume that the segment <o> of these exceptions is not a gender morpheme but is simply the final vocalic segment that happens to occupy the end position of the reduced word. My assumption is based on the fact that as a segment of a reduced word, <o> differs from the morpheme [-o] in nature and distribution. The following two tests for (1) diminutive formation and (2) plural formation will confirm my assumption about the non-morphological nature of <o>.

3.1.1 TEST 1.

In Italian, a diminutive affix is added to a nominal stem and the diminutivized form retains the gender of the stem as shown in (8)a. Contrary to (8)a, the final segment <o> of the exceptions blocks the insertion of the diminutive morpheme [-in-] as indicated in (8)b,c.

- (8)
- a. morpheme <o>: *tavolo* 'table' > *tavol-in-o* 'little table'
 - b. segment <o>: *dinamo* 'dynamo' > **dinamino*, **dinamina*
 - c. segment <o>: *moto* 'motor' > **motino*, **motina*

The different results regarding diminutive formation suggest that the ending <o> of feminine nouns in (8)b,c is not a gender morpheme as in the case of masculine nouns in (8)a, but it is simply a final vocalic segment. The non-morphological nature of the segment <o> disallows its interaction with the diminutive affix resulting in a blocking of diminutive formation.

3.1.2 TEST 2.

With regards to plural formation, contrary to <o>~[-i] alternation of masculine nouns (see Table 1), the end segment <o> is invariable in the plural as indicated by the data in (9).

- (9) a. la dinamo .sg / le dinamo .pl / *le dinam-e .pl / *le dinam-i .pl
 b. la moto .sg / le moto .pl / *le mote .pl / *le moti .pl

The impossibility for the feminine nouns ending in <o> to pluralize additionally proves that the segment <o> of the feminine nouns is not a morpheme and therefore its nature differs from the masculine gender marker <o>.

3.1.3 OTHER FORMS.

Further, other feminine reduced compounds that do not end in <o> or <a> show identical behavior to the forms in (6) with regards to pluralization (9) and diminutive formation (8). As can be seen in (10), the reduced forms *bici* 'bike' and *tele* 'television' cannot undergo diminutive formation and they are invariable in the plural.

- (10) a. *bici* < *bicicletta* dim: **bicina* .pl: *le bici* / **le bice*
 b. *tele* < *televisione* dim: **telina* .pl: *le tele*¹

The identical behavior between nouns in (6)a-f and nouns in (10) with regard to the morphological tests (1) and (2) proves that the end vocalic segment of reduced forms of nouns cannot be considered gender morphemes.

3.1.4 CONCLUSION.

The data in (8) through (10) suggests feminine nouns in <o> cannot be considered exceptions to masculine nouns ending in <o>. The diminutive and pluralization tests clearly show that the final vocalic segment <o> of feminine nouns is not a gender morpheme, but simply the end segment of a reduced compound noun. Because of such morphological differences, it is possible to claim that there are not exceptions to the rule that all nouns ending in <o> are masculine.

3.2 MANO AND THE HYPOTHESIS OF TWO DISTINCT LEXICAL ENTRIES.

Among the exceptions in (6), the noun 'mano' has the most controversial status: it declines as a masculine noun, i.e., it shows the <o>~[-i] alternation, but it requires feminine agreement morphology as shown in (11).

¹ These examples were brought to my attention by Judy Berstein (P.C.)

(11) [la (.f.sg) [mano (.m.sg)]] ~ [le (.f.pl) [mani (.m.pl)]]

Without any analysis and just by looking at how agreement occurs, we can say that *mano* is feminine and, therefore, it constitutes the only real exception to the one-to-one correspondence between the morpheme <o> and the masculine gender. However, at a deeper level of analysis, it is possible to account for the apparent exceptional behavior of *mano*. The essential clue comes from analyzing 'mano' together with other nouns denoting body parts.

In the analysis of French and English body part nouns in inalienable possessive constructions, Vergnaud and Zubizarreta (1992:596-7) suggest that the lexical ambiguity between the inalienable and the alienable interpretation of body part nouns can be resolved assuming that body part nouns have two distinct lexical entries. One entry defines an inalienable entity and it is characterized by taking a possessor argument, whereas the other entry defines an alienable entity and does not take a possessor argument. Following Vergnaud and Zubizarreta's hypothesis, I propose that *mano* as a body part noun has two lexical entries and I suggest (12) as the correct underlying representation for *mano*.

(12) la [mana] *mano*

In (12), two lexical entries are associated with *mano*, one overt masculine *mano* and the other covert feminine *mana*. This lexical representation accounts for the feminine agreement in (11), where the determiner is assumed to agree in gender with the covert feminine entry. In the following sections, I will show that the hypothesis that body part nouns have two distinct lexical entries is correct accounting in this way for the agreement facts in (11) and confirming the presence of the covert lexical entry *mana*. For this explanation, I will demonstrate that the overt lexical entry 'mano' is masculine; therefore, it does not constitute an exception to the rule that nouns ending in <o> are masculine.

3.2.1 BODY PART NOUNS IN ITALIAN.

In Italian, it is not uncommon for body part nouns that denote two or more identical parts of the body (e.g. *orecchio* 'ear') to have two distinct lexical entries. There are three types of bilinguistic patterns. The first pattern is represented by the noun for 'ear' (*orecchio/a*). This noun has two distinct lexical entries one feminine (*orecchia*) and one masculine (*orecchio*). There is no semantic distinction between the two entries. They can be used interchangeably within the same sentence as shown in (13).

(13) a. *orecchio/orecchia* (sg.) *orecchi* (.m.pl)/ *orecchie* (.f.pl)

 b. *Ho notato che hai un-a orecchi-a piu' grande dell'altr-a/altr-o*
 I have noticed that (you) have one .f ear .f bigger than the other .f /other .m
 I have noticed that you have one ear bigger than the other

- c. *Ho notato che hai un orecchi-o piu' grande dell'altr-o/altr-a*
 I have noticed that (you) have one .m ear .m bigger than the other .m /other .f
 I have noticed that you have one ear bigger than the other

In Italian nouns are lexically marked for only one gender. It follows that nouns such as 'ear' with two morphological forms of identical meanings can be accounted for only by assuming the existence of two underlying lexical entries one marked for masculine gender and the other marked for feminine gender.

The second pattern belongs to nouns that are masculine in the singular but have two plural lexical entries, one masculine and the other feminine as in (14).

(14)	.m .sg	.m .pl	.f .pl
a.	il budello 'intestine'	i budelli 'alleys'	le budella/e 'intestines'
b.	il cervello 'brain'	i cervelli 'intelligent people'	le cervella/e 'brain'
c.	il labbro 'lip'	i labbri 'rim'	le labbra 'lips'
d.	il ginocchio 'knee'	i ginocchi 'knees'	le ginocchia/e 'knees'
e.	il dito 'finger'	i diti 'fingers'	le dita 'fingers'

In some cases, as the examples (14)a-c show the <i>~<a> plural contrast is semantically motivated. The masculine plural is characterized as [-human] and refers to an inanimate object as the translation indicates, whereas the feminine plural, ending in <a>, is characterized as [+human] and refers to a body part. Similar to the case of 'ear', for the nouns in (14), the possibility to have two genders is due to the existence of two separate lexical entries marked respectively for feminine and for masculine gender.

The last pattern is that of *mano* as shown in (12). The first evidence that supports the assumption that *mano* has two underlying lexical representations as do other body part nouns comes from the test of diminutive formation. Two distinct lexical representations emerge when *mano* is diminutivized as indicated in (15) and both of them can be used interchangeably.

- (15) a. *la manina* (f) 'little hand'
 b. *il manino* (m) 'little hand'

As seen in (8)a above, the addition of the diminutive affix [-in-] to nominal stem does not modify the gender feature of the stem: if the noun is masculine and it ends in <o> the diminutive form of the noun is still masculine and it ends in <o>. The facts that *mano* has a masculine and a feminine diminutive forms that are semantically identical shows that *mano* must have two distinct underlying lexical representations from which the two forms in (15) are derived.

The second example of evidence supporting the billexical nature of *mano* comes from some regional varieties of central Italian. For the speakers of these varieties, the feminine singular *la mana* and the plural *le mane* alternate with the more standard *la mano* and *le mani*, respectively. This proves that the lexical forms *mana* and *mano* are both retrievable from the Lexicon as two distinct entries.

3.2.2 THE MASCULINE NATURE OF 'MANO'.

In order for *mano* to have two lexical entries and assuming *mana* to be feminine, *mano* must in itself be masculine in gender. Two factors suggest this assertion is correct. First, the masculine nature of *mano* can be inferred by examining some aspects of derivational adjective formation with the suffix [-ale]. Like the other derivational morphemes in Italian, [-ale] attaches to a nominal stem (usually without the gender morpheme) as illustrated in (16).

- (16) a. post-a 'post' > post-ale 'postal'
 b. commerci-o 'commerce' > commerci-ale 'commercial'

In contrast, *mano* and a small group of masculine nouns ending in <o> do not lose their gender marker after the insertion of the derivational affix. The final marker <o> becomes <u> once the suffix [-ale] is added as shown in (17).

- (17) a. *mano* > man-u-ale/ manovale 'manual'
 b. port-o 'harbor' > port-u-ale 'of the harbor'
 c. spirit-o 'spirit' > spirit-u-ale 'spiritual'
 d. flutt-o 'wave' > flutt-u-ale 'of the wave'
 f. ann-o 'year' > ann-u-ale 'annual'

The fact that derivation with *mano* is patterned after other masculine nouns suggests that <o> in *mano* marks masculine gender. Phonologically, the <o> of *mano* and of all the other examples in (17) is an underlying <u> in presence of the derivative suffix [-ale]. Because of the prohibition on nouns ending in unstressed <u> for Italian (section 2), the underlying <u> must surface as an <o> when it occupies the final position.

Secondly, *mano* is masculine when it is a [-human] object as shown in the gender of the derived nouns and adverbial expression in (18)

- (18) a. il manufatto/manofatto 'manufactured product'
 b. il manuale 'the manual'
 c. *mano a mano* 'little by little'

The masculine nature of *mano* and its correlation with a [-human] suggests that the presence of a covert feminine lexical entry is necessary to express [+human] and to explain the feminine agreement in (11). As seen in (13), it is common among body part nouns to express the body part through a feminine lexical entry; the same is also true for *mano*.²

From the above analysis, it is possible to conclude that there are no exceptions to deny the observation that that all feminine nouns end in <a>. I demonstrated that the segment <o> for the exceptions is either a final vocalic segment of a reduced compound that in the full form ends in <a>, or it is a morpheme indicating the masculine form of a noun with both a masculine and feminine lexical entry, the feminine being the underlying form as in (12).

² It is interesting to note that a property of body part nouns is to undergo semantic gender assignment. See Trond Trosterud (2001) for a similar conclusion in Norwegian

3.3 MASCULINE NOUNS ENDING IN <a>.

With regard to the so-called masculine exceptions (i.e., masculine nouns ending in <a>), it is important to note that they are either loans from Ancient Greek, or they were loans in Latin and entered the Italian lexicon already having the status of loans.³ The masculine nouns ending in <a> can be divided into two classes. The first is a closed class of nouns formed with the derivational suffixes shown in (19).

- (19) a. -ta⁴: poeta 'poet', pira-ta 'pirate', acrobat-ta 'acrobat'
 b. -ema: problema 'problem', poema 'poem'
 c. -emma: strategemma 'stratagem'
 d. -isma: charisma 'charisma'

The second class of masculine nouns ending in <a> is an open class of noun formed with the derivational suffixes shown in (20).

- (20) a. -oma: carcinoma 'carcinoma'
 b. -gramma: programma 'program'
 c. -ista: ciclista 'bicycle rider'.

From the examples in (19) and (20), I assume that the final <a> is part of the derivational suffix of the loan word and it is not a gender morpheme added to the stem. These nouns, then, must be considered as having a lexical representation similar to those of recent loans as in (21).

- (21) a. bar + [default gender]
 b. poema + [default gender]

Masculine nouns ending in <a> like recent loans lack a gender marker and they are masculine either by default or because they denote a male individual.

The non-morphological nature of the final <a> of these so-called exceptions is confirmed by the fact that it has a different distribution than the feminine marker <a> in the plural and in the diminutive formation. In the plural, the final <a> of the exceptions becomes <i> and not <e> as would be expected if the final <a> of the exceptions had the same morphemic status as the feminine marker <a>. This is illustrated in (22).

- (22) il poema .sg i poemi .pl / * i poem-e .pl / *le poem-e .pl

In diminutive formation, the insertion of the diminutive morpheme [-in-] into these exceptions change the nature of the end vocalic segment into the gender morpheme corresponding to its inherent masculine gender feature.

³ As Martin Huld (P.C.) pointed out to me, exceptions such as poeta and pirata were exceptions in Latin as well, and they entered the Italian lexicon having the status of exceptions.

⁴ I owe to Professor R. Kayne (P.C.) the intuition that [-ta] is a derivational morpheme in Italian. A similar affix description with [-t] as an agent marker is given for Italian by Pisani (1974:115).

- (23) a. tavolo > tavolo-in-o 'little table' (standard masculine noun)
 b. casa > casa-in-a 'little house' (standard feminine noun)
 c. poem<a> > poem-in-o / *poemina 'little poem' (exception)

The examples in (23) show that the final <a> of the exception is not a feminine marker, but it simply a final vowel of a derivational morpheme whose gender is inherently masculine as the masculine diminutive form suggests.

A similar pattern of diminutive formation occurs with recent loans. Their diminutive form is masculine, mirroring their acquired unmarked gender, as shown in (24).

- (24) a. bar > baretto 'small bar'
 b. computer > computerino 'small computer'
 c. panda > pandino ' little panda'

Recent loans ending in consonant or as well as recent and integrated loans ending in <a> are masculine because loans, not because of their final vocalic or consonantic endings.

To conclude, the above analysis demonstrates that in the case of the so-called masculine exceptions, the end vocalic segment <a> is not a morpheme comparable to the feminine morpheme <a>. Therefore, masculine nouns ending in <a> do not constitute an exception to the one-to-one correlation between gender morphemes and the gender features.

3.4 WORD MARKERS.

As I have previously demonstrated using the diminutive and plural tests, the end vocalic segments of the exceptions are not comparable to the morphemes <o> and <a>. It follows, then, that the so-called exceptions do not motivate the existence of word markers. In addition, as Harris's paper seems to imply, the end vocalic segment of the exceptions cannot be considered having the same status as the <o> and <a> word markers of the inner core declensional classes. In Harris's theory (1991: 45), two rules operate on feminine nouns: (i) the Feminine Marker Rule, which supplies the "class diacritic <a>" to stems lexically marked for the gender feature [+feminine], and (ii) the Marker Realization Rule, which dictates the insertion of the suffix <a> if the stem is marked by the class diacritic <a>; otherwise, the stem is assigned the suffix <o> as the default class marker. These two rules, however, are unable to account for the so-called exceptions.

Feminine exceptions fail to satisfy the Feminine Marker Rule in that they are marked as [+feminine] for gender, but their word marker is <o>. With regard to these nouns, Harris concludes (i) the end vocalic segment <o> of the moto type of exception is not a word marker (1991:37, #14) and (ii) in the case of *mano*, "feminine forms with word marker <o> fall outside the systematic possibility of Spanish morphology" (1991:50).

Masculine exceptions, on the other hand, fail to satisfy the Marker Realization Rule. The Marker Realization Rule should assign them the default marker <o> because these nouns are not marked as [+feminine]. In order to justify the presence of the word marker <a> on the exceptions, Harris assumes that these nouns are part of the residue class of nouns (1991: 33). It may be correct to assume that the masculine exceptions are part of the residue class of nouns. As with the other residue nouns, they form a closed class of substantives, and their gender is always predictable. But it should be noted that as residue nouns, the masculine exceptions cannot be

used as exceptions to nouns of other declensional classes. Therefore, the so-called exceptions do not justify the assumption that the <a> of the inner core nouns is a word marker.

4. CONCLUSIONS.

In the present paper, I argued against the claim that an arbitrary relation exists between gender features and gender forms. Such a claim is based on the existence of a small group of exceptional nouns that deny the one-to-one correspondence between masculine and feminine gender and the morpheme <o> and <a> suffixed to nouns respectively. As the data analysis shows, however, the claim of arbitrariness is empirically unsubstantiated. I have demonstrated that gender morphemes and the end vocalic segments of the exceptions have a different nature and distribution; therefore, standard nouns and exceptions cannot be considered part of the same noun classes. In other words, the analysis demonstrates that there are not exceptions to the perfect correspondence that all nouns ending in <a> are feminine and those ending in <o> are masculine. To conclude, in the absence of arbitrariness, there are no principled reasons to postulate the existence of word markers for the expression of gender. As the data and the analysis have proved, in Italian, <o> and <a> are gender morphemes expressing masculine and feminine gender features.

REFERENCES

- Berstein, Judy. 1993. The Syntactic Role of Word Markers in Null Nominal Constructions. *Probus* 5. 5-38.
- Harris, James. 1996. The Syntax and Morphology of Class Marker Suppression in Spanish. In *Grammatical Theory and Romance Languages: Selected Papers from the 25th Linguistic Symposium on Romance Languages* (lsrl xxv) Seattle, 2-4 March 1995, ed. by Karen Zagona, 99-122. Amsterdam: John Benjamins Publishing Co.
- Harris, James, 1991a. The Exponence of Gender in Spanish. *Linguistic Inquiry* 22 (1). 27-62.
- Harris, James, 1991b. The Form Classes of Spanish Substantives in *Yearbook of Morphology*, ed. by G. Booij and J. van Marle, # 65-88. The Netherlands: Kluwer Academic Publishers.
- Nespor, Marina. 1993. *La Fonologia*. Bologna: Mulino.
- Pisani, Vittore. 1974. *Grammatica Latina: Storica e Comparata*. Torino: Rosenberg and Sellier.
- Trosterud, Torne. 2001. Genustilordning i Norsk er Regelstyrt. *Norsk Lingvistisk Tidsskrift* 19. 29-58.
- Vergnaud, J.R. Zubizarreta, M.L. 1992. The Definite Determiner and the Inalienable Constructions in French and English. *Linguistic Inquiry*, 23 (4). 595-652.

THE ALLOMORPHY OF THE ITALIAN MASCULINE DEFINITE ARTICLE:
A USAGE-BASED ACCOUNT*

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1. INTRODUCTION.

This paper shows that the usage-based framework proposed by Bybee (2001) can be satisfactorily applied to the analysis of the distribution of the allomorphs of the Italian masculine definite article. Also, I argue that, compared to standard generative phonological accounts, a usage-based based account offers new insights to this rather complex phenomenon, in particular, regarding changes that appear to be taking place in the current distribution pattern of the allomorphs. I first introduce the distribution pattern of the masculine definite article in Modern Standard Italian (MSI) (§ 2). Then I give a brief overview of two well known phonological accounts offered within the classic generative framework and draw attention to some inadequacies they reveal (§ 3). Next I sketch an account of the phenomenon within the usage-based framework, identifying some fundamental differences between this approach and standard generative accounts (§ 4). Finally I discuss the significant advantages of a usage-based analysis compared to standard generative phonological analyses (§ 5). Section 6 is a short conclusion.

2. THE DISTRIBUTION OF THE ITALIAN MASCULINE DEFINITE ARTICLE.

Singular allomorph	Plural allomorph	Environment of occurrence
<i>il</i>	<i>i</i>	<ul style="list-style-type: none"> • Single consonant other than /ʃ/, /ɲ/: <i>il ragazzo</i> ‘the boy’, <i>il mare</i> ‘the sea’ • the affricates /tʃ/, /dʒ/: <i>il cielo</i> ‘the sky’, <i>il gelo</i> ‘the frost’ • consonant clusters of the type stop, /f/ + /r/, /l/: <i>il grillo</i> ‘the cricket’, <i>il plico</i> ‘the package’, <i>il fratello</i> ‘the brother’, <i>il flauto</i> ‘the flute’
<i>lo</i>	<i>gli</i>	<ul style="list-style-type: none"> • consonant clusters of the type /s/ + C: <i>lo studente</i> ‘the student’, <i>lo sbaglio</i> ‘the mistake’ • the affricates /tʃ/, /dʒ/: <i>lo zucchero</i> ‘the sugar’, <i>lo zero</i> ‘the zero’ • /j/, /ʃ/, /ɲ/: <i>lo iodio</i> ‘the iodine’, <i>lo scialle</i> ‘the shawl’, <i>lo gnomo</i> ‘the gnome’ • /ps/, /pn/, /pt/, /ks/, /kt/: <i>lo psicologo</i> ‘the psychologist’, <i>lo pneumatico</i> ‘the tire’, <i>lo pterodattilo</i> ‘the pterodactyl’, <i>lo xilofono</i> ‘the xylophone’, <i>gli ctenofori</i> ‘the ctenophores’¹
<i>l’</i>	<i>gli</i>	<ul style="list-style-type: none"> • vowel and diphthong: <i>l’amico</i> ‘the friend’, <i>l’autista</i> ‘the driver’ • /w/ in original Italian lexical items: <i>l’uovo</i> ‘the egg’.²

TABLE 1: MSI MASCULINE DEFINITE ARTICLE.

* I wish to thank Jurgen Klausenburger for his helpful comments and suggestion. Any errors remain, of course, my own.

¹ Note that /ps/, /pn/, /pt/ are quite restricted clusters in Italian and /ks/, /kt/ are rare, and both sets are limited to highly specialized scientific vocabulary.

² Foreign loanwords beginning with /w/ select *il*: *il whiskey* ‘the whiskey’, *il wok* ‘the wok’, *il workshop*.

The masculine definite article allomorphy shown in Table 1 is restricted to MSI and some Tuscan dialects. All the other Italian dialects have only one of the two sets of forms. As Vanelli (1992) accurately points out, dialects are characterized either by a V+l type singular definite article or by a l+ V type. Also, the original forms of the masculine definite article were *lo* for the singular and *li* for the plural (< Lat. demonstrative ILLU(M)) whereas *il*, *l*, *i* are novel formations.

3. THE ITALIAN MASCULINE DEFINITE ARTICLE ALLOMORPHY WITHIN STANDARD GENERATIVE PHONOLOGY.

Explaining the distribution of the different allomorphs of the MSI masculine definite article exclusively in phonological terms (i.e., as determined by the strict phonological conditioning of the following segments/clusters) would require three main steps: (i) identifying the specific feature(s) of initial segments/clusters that trigger the selection of one allomorph over another,³ (ii) positing an underlying form of the masculine definite article, (iii) formulating the phonological rules to derive the different allomorphs. Within the standard generative phonology framework, providing a completely satisfactory and unifying characterization of the segments/clusters that select *lo* has proven to be quite challenging, especially without adopting (highly) abstract and empirically problematic features and/or principles (see Davis 1990; Vanelli 1992).

3.1 TWO GENERATIVE ACCOUNTS.

The best known phonological accounts of the Italian masculine definite article allomorphy more recently offered within the traditional generative tradition are Davis (1990) and Vanelli (1992).⁴ Both analyses explain the opacity of the distribution pattern in terms of syllabification. Central to Davis's (1990) account are Steriade's (1982) syllabification rules and the Sonority Hierarchy (Davis 1990:46) shown in Table 2.

Segment	Sonority Value	Characteristic
Vowels	8	
Liquids	7	
/m/	6	
/n/	5	
Coronal Fricatives	4	
Non-Coronal Fricatives	3	
Voiced Stops	2	
Voiceless Stops	1	
		Least Sonorant

TABLE 2: DAVIS'S (1990) SONORITY HIERARCHY.

³ Given that an opaque allomorphy comparable to the *il* ~ *lo* alternation never developed in the case of the feminine article, it would also be interesting to establish what crucial phonetic differences between [a], [e] and [o] allowed *la/le* to survive in every environment.

⁴ Other standard generative analyses are Romeo (1969), Muljačić (1971, 1974), Radzinski (1987).

According to Davis, the syllabification process considers the respective sonorities of the first two segments following the definite article. If the sonority distance between the two first segments is LESS THAN 4, *lo/gli* are selected and syllabification is as follows: the first consonant of the cluster is not incorporated in the syllable onset but becomes the coda of the preceding syllable formed by the article. If the sonority distance between the first two segments is GREATER THAN 4, a syllabic onset can form and *il/i* are selected. These situations are illustrated in (1)a,b, respectively.

- (1) a. *spirito* ‘spirit’
 coronal fricative [s] sonority value = 4
 voiceless stop [p] sonority value = 1
 sonority distance between [s] and [p] = 3 (less than 4)
 Syllabification: $lo\pi r i\sigma to$
- b. *prato* ‘maedow’
 voiceless stop [p] sonority value = 1
 liquid [r] sonority value = 7
 sonority distance between [p] and [r] = 6 (greater than 4)⁵
 Syllabification: $i l\sigma pra\sigma to$

A major problem with Davis’s analysis is that the sonority values it crucially relies on are not empirically grounded in the sense that Davis does not clarify on which basis (i.e., acoustic, articulatory, both) they are established. Also, it remains unclear why the value 4 represents the threshold value. It is true that 4 is the median value in the Sonority Hierarchy scale Davis proposes, but this seems an arbitrary stipulation.

As for the single segments /ʃ/, /ɲ/, /tʃ/, and /dʒ/ Davis claims that take *lo* because they are always long in intervocalic position. This being the case, Davis (1990:49) proposes that these segments have the underlying representations illustrated in (2).

- (2) a. \int η
 C C C C
 b. $\begin{array}{c} \diagup \quad \diagdown \\ t \quad s \\ | \quad | \\ C \quad C \end{array}$ $\begin{array}{c} \diagup \quad \diagdown \\ d \quad z \\ | \quad | \\ C \quad C \end{array}$

The representations in (2) seem to indicate that /ʃ/ and /ɲ/ constitute clusters of two identical segments whose sonority distance equals 0. The affricates /tʃ/ and /dʒ/, on the other hand, would be analyzed as stop + coronal fricative clusters with a sonority distance of less than 4. Therefore, these segments will take *lo*. Examples of how syllabification would operate in these cases are shown in (3).

⁵ I thank an anonymous reviewer for pointing out to me that it is necessary to apply the absolute value operation to the result (e.g., $|-6| = 6$). What is considered here is the distance between two points on a scale (the Sonority Hierarchy) and, from a mathematical standpoint, an absolute value is a distance.

- (3) a. *scialle* ‘shawl’
 coronal fricative[ʃ] sonority value = 4
 coronal fricative[ʃ] sonority value = 4
 Sonority distance between [ʃ] and [ʃ] = 0
 Syllabification: l o ʃ ʃ a ʃ l : e
- b. *zucchero* ‘sugar’
 voiceless stop [t] sonority value = 1
 coronal fricative [s] sonority value = 4
 Sonority distance between [t] and [s] = 3
 Syllabification: l o t s s u k : e r o
- c. *zero* ‘zero’
 voiced stop [d] sonority value = 2
 coronal fricative [z] sonority value = 4
 Sonority distance between [d] and [z] = 2
 Syllabification: l o d z e r o

But /tʃ/ and /dʒ/ take *il* (*il cielo* ‘the sky’, *il giorno* ‘the day’) although the sonority distance between the two segments is exactly the same as for /tʃ/ and /dʒ/. This discrepancy between the two pairs of affricates is not addressed by Davis.

The most serious problem with Davis’s analysis, however, is in its core assumption, i.e., defining cluster tautosyllabicity based on a fixed value of sonority distance between the cluster components. If such an assumption were, in fact, true, syllabifications like those in (4) would be correct because the sonority distance between the segments forming the clusters is greater than 4.

- (4) a. *àcre* ‘acid’ → *a:ʃkre
 b. *ritmo* ‘rhythm’ → *ri:ʃtmo

Given that tonic vowels are always long in Italian in the environment of an open syllable, we would expect vowel lengthening to take place in (4). But, as shown in (5), the stressed vowels in (4) are actually short; therefore, we must assume that they occur in closed syllables.

- (5) a. *a:kre vs. akre → akʃre
 b. *ri:tmo ritmo → ritʃmo

The following question, then, arises: Why consonant clusters characterized by a sonority distance greater than 4 must form an onset when following the definite article *il*, as shown in (1)b, whereas they must split when they occur within such words as in (5)? It could be argued that stop + liquid clusters must form an onset when followed by *il* in order to avoid an illicit coda (e.g., *il prato* ‘the meadow’ → ilpʃraʃto; see below). But selection of *lo* would also prevent

the formation of an illicit coda giving the syllabification lo\$pra\$to, which, in fact, is more consistent with the canonical Italian syllable (C)CV.

Vanelli (1992) argues that *lo* is selected by /s/ + C clusters because /s/ cannot be part of the following onset or a violation of the Sonority Principle Constraint would occur, the coronal fricatives being higher in sonority than stops. Additional evidence in support of /s/ syllabifying as the coda of the preceding syllable comes, Vanelli maintains, from the fact that, although Italian vowels are always long in open syllables, there is no indication of vowel lengthening in vowels preceding /s/+ C clusters ([fa:to] ‘fate’ vs. [fasto] ‘splendor’, [vi:ta] ‘life’ vs. [vistä] ‘sight’). Also, in the context of /s/+ C clusters, *il* would generate a two-segment coda (/ls/), which is unacceptable because codas can only consist of one segment. In the case of sentence initial /s/+ C clusters, the /s/ is considered extrasyllabic and becomes part of the onset via a “special rule” (Vanelli 1992: 53).⁶ As for Vanelli’s analysis of the dental affricates /tʃ/ and /dʒ/, the palatal fricative /ʃ/ and the palatal nasal /ɲ/, they are considered complex segments characterized by two special attributes: (i) they are intrinsically geminate because they are always realized as such in intervocalic position; (ii) they are ambisyllabic, i.e., when occurring word initially preceded by a vowel they can “split” into two segments one of which syllabifies as the coda of the preceding vowel and the other as the onset of the following vowel. Because Vanelli claims that /tʃ/, /dʒ/, /ʃ/ and /ɲ/ are to be considered single segments if they are preceded by a consonant, the following question arises: why are *per sciopero* (per\$ʃo\$pe\$ro) ‘for strike’ and *in sciopero* (in\$ʃo\$pe\$ro) ‘on strike’ possible, but **il sciopero* (il\$ʃo\$pe\$ro) is not? Vanelli’s answer is that the phonological system of Italian has favored the intrinsic feature of geminate, and the selection of *il* would go against the system, making them single segments. Examples such as *per/in sciopero* do not represent a serious disruption of the system because of their extremely low frequency.⁷ Although Vanelli does not address the issue directly, her argument implies that the different behavior of the palatoalveolar affricates /tʃ/ and /dʒ/ (which select *il* rather than *lo*) is determined by the fact that they are not intrinsically geminate (/vitʃino/ ‘neighbor’, /latʃ:o/ ‘string’); therefore, they behave as single segments when preceded by the definite article.

I conclude this section by pointing out that David (1990) and Vanelli (1992) do not discuss why the palatal glide [j] selects *lo*. Notice that if [j] is treated as a consonant, we would predict that it selects *il*, whereas if it is treated as a vowel (like [w]), it should take *l* (*l’uovo* ‘the egg’, *l’uomo* ‘the man’, etc.). Clearly, the behavior of [j] represents a problem for both Davis and Vanelli because it cannot be satisfactorily analyzed by any of the theoretical principles they adopt.

⁶ Vanelli does not formalize the “special rule” she proposes, nor does she explain why the Sonority Principle does not have to hold sentence initially.

⁷ But are cases like *in sciopero* really low-frequency? Note that Vanelli (1992) provides no empirical data to support her claim. Besides, notice that deletion of the final /ə/ of infinitives, which is an extremely common process in Italian, is not blocked before clusters/segments that reject *il* (e.g., *far sciopero*, *storie*, *sbagli*, *zero*, etc.).

3.2 PROBLEMS WITH STRICTLY PHONOLOGICAL ANALYSES.

As shown in the previous section, the major drawback to traditional generative phonological accounts is that they must adopt (highly) abstract and empirically problematic features and/or principles (e.g. extrasyllabicity, ambisyllabicity, Sonority Principle, Sonority Hierarchy⁸). Moreover, within a rule based approach, the problematic issues arise of which allomorph constitutes the rules input and which rules must apply to derive the other allomorphs. Positing /l/ (as in Muljačić 1971, 1974) as input is quite unsatisfactory because it would require two insertion rules (i.e., insertion of /i/ and /o/ to derive *il* and *lo* respectively), which are difficult to justify. The epenthesis of /i/ is a extremely marginal phonological process, attested in Old Italian only in the very restricted environment of following /s/ + C clusters preceded by the prepositions *in* ‘in’ and *con* ‘with’ (e.g., *in Ispagna* ‘in Spain’, *con istudio e perseveranza* ‘with study and perseverance’). This process completely disappeared from the language by the 19th century. As for /o/ insertion, it is a process totally unknown in Italian (see also Dressler 1984).⁹ If /i l/ is taken as input (as in Romeo 1969), two rules must be assumed: (i) /i/ deletion to derive /l/ before vowels; and (ii) /o/ insertion, which would apply after /i/ deletion, to generate /lo/. But this scenario is entirely unmotivated from a phonological point of view (Dressler 1984: 42, calls it “crazy”) because what could possibly be the phonetic/phonological trigger of /i/ deletion in *il albero* ‘the tree’ → *l’albero*, and /i/ deletion plus subsequent /o/ insertion in *il specchio* ‘the mirror’ → *l specchio* → *lo specchio*?

Finally, if /lo/ is considered the input, /l/ is correctly accounted for by /o/ deletion triggered by the following vowel. But formalizing the derivation /lo/ → [i l] is quite challenging because, even though the second step of the derivation, [i] insertion, can be justified in terms of cluster simplification, the first step, /o/ deletion, appears utterly unmotivated because of the environment of following consonant/cluster.¹⁰

A third (and the most significant) problem with traditional phonological analyses is that they cannot satisfactorily account for the fact that *il* is increasingly used in place of *lo* with nouns beginning with /p/ + C clusters (*il pneumatico* ‘the tire’, *il pterodattilo* ‘the pterodactyl’, *il psicologo* ‘the psychologist’), as well with all the other restricted clusters (i.e., /kn/, /ks/, etc.), the dental affricates (/tʃ/ and /dʒ/), and /j/ (*il iodio* ‘the iodine’) (see Marotta 1993, Russi 2001). Nor can traditional phonological analyses adequately explain why autochthonous words and loan-words often behave differently with respect to definite article selection (e.g. *l’uovo* ‘the egg’ vs. *il wok* ‘the wok’).¹¹

⁸ For interesting criticism (as well as interesting alternatives) to the Sonority Hierarchy as a valid explanation of segmental sequential constraints, see Ohala (1992).

⁹ The typical Italian epenthetic vowel is /i/ (cf. *psicologo* → *piːsicologo* in lower/dialectal registers). In any case, /o/ would do quite poorly as an epenthetic vowel because it is neither the weakest nor the least marked vowel in Italian.

¹⁰ Note that deriving the plural allomorphs (/i/, /ʎi/) is even more difficult because both forms end in the same segment /i/, so the conditioning environment can no longer be that of the following segments.

¹¹ It has been argued (Marotta 1993) that the different article selection by autochthonous words and loan words beginning with labiovelar glide (*l’uovo* [lwɔvo] vs. *il whiskey* [ilwiski]) is because in autochthonous words [w]

Finally, traditional (generative) phonological analyses fall short of explaining why *il* is the first form to be acquired (and unconditionally used) by children, as well as the only form to be involved in slips of the tongue/pen.¹²

Summarizing, a strictly phonological, generative based account of the allomorphy of the Italian masculine definite shows three major inadequacies: (i) it must rely on highly abstract and empirically questionable principles; (ii) it employs rules that are problematic both in terms of their input and in terms of the derivational processes themselves; (iii) cannot account for individual variation in the selection of the article allomorphs.

4. A USAGE-BASED ANALYSIS.

4.1 THE FRAMEWORK.

Bybee (2001) proposes an approach to phonological analysis that contrasts radically with the traditional generative approach. Two central assumptions in Bybee's framework are the following: (i) cognitive as well as psychological processes and principles that govern language are not language specific but are the same processes and principles as those that govern other aspects of human cognitive and social behavior; (ii) language use plays a (considerable) role in shaping the form and content of sound systems in the sense that FREQUENCY (both token and type) is believed to affect the mental representation of lexical items. Frequency is indeed a key concept in Bybee (2001) and is directly linked to language change because it has impact on the actual phonetic shape of words. On the one hand, recurrent occurrence and repetition (i.e., high frequency) leads to lexical strength, which, in turn, promotes lexical stability so that highly frequent IRREGULAR forms/paradigms tend to remain stable and resist change. Conversely, low frequency (i.e., marginal rate of occurrence) is responsible for lexical weakening and promotes regularization (e.g. analogical leveling) so that low frequency forms more easily change to conform to regular patterns/paradigms. However, repetition also leads to a reduction of form/meaning because of habituation (Haiman 1994). Frequency, then, seems to be responsible for two contradicting phenomena: language stability and language change. This apparent contradiction occurs because we are dealing with different levels of language, namely the phonetic level and the morphosyntactic level. High frequency promotes phonetic change but hinders grammatical and/or analogical change (Bybee 2001:12). Low frequency, on the other hand, leads to fossilization of and eventually loss of linguistic patterns.

Another important difference between Bybee's approach and the traditional generative phonology approach relates to mental representation and storage of linguistic forms. Typical of the generative framework is the list/rule separation, i.e., the assumption that speakers have separate mental representations of basic (underlying) forms and sets of rules through which derived forms are generated, with irregular forms being independently stored. Bybee rejects this assumption and proposes that generalizations about forms are not listed separately but rather

can only be followed by [ɔ] whereas loan words are always followed by other vowels, [i] in particular. Therefore, in loan words, the glide is reinterpreted as a consonant and consequently triggers *il* selection. But the soundness of this argument is upset by examples such as *il wok*, *il workshop*, i.e. loan words characterized by the same [wɔ] initial sequence as autochthonous words.

¹² Also note the immediate response to the question, "What is the masculine definite article in Italian?" Both linguistically naïve and sophisticated native speakers of all ages (as well as all socio-cultural extractions), consistently cite *il*, the other allomorphs being mentioned only later (if at all).

“emerge” directly from them: language is considered as an emergent system, in the sense that simple properties of a substantive nature create structure when applied repeatedly. Also, redundancy in representation is assumed, as well as different degrees of generalization and segmentation, and categorization is based on identity or similarity. In Bybee’s view, the storage of linguistic representations is complex because representations are closely interconnected in a composite compact network, and lexical items can be stored multiple times. Conversely, access to representations is not complex because forms are accessed directly, rather than being derived by the application of rules. Moreover, because of this network model of storage/representation, activation of (i.e., access to) one item also activates phonetically (and semantically) related items.

Additionally, in Bybee’s approach, linguistic representations are viewed as SCHEMAS, i.e., “organizational patterns” that emerge from the way/s forms are associated with one another in a vast, complex network of phonological, semantic, and sequential relations. Schemas are seen as static associative networks rather than statements on (rules of) derivational processes. Also, they are product-oriented in the sense that they do not make reference to abstract representations but refer to actual forms produced by speakers.

Having introduced the key concepts of the usage-based framework I will adopt, I now apply it to the analysis of the distribution of the allomorphs of the Italian masculine definite article.

4.2 THE DISTRIBUTION OF THE ALLOMORPHS OF THE ITALIAN MASCULINE DEFINITE ARTICLE.

Approaching the allomorphy of the Italian masculine definite article from the usage-based framework, we can posit a linguistic representation encompassing a more general schema for definite article that would include all forms (i.e., singular and plural, masculine and feminine). However, more restricted schemas for the masculine, the feminine, the singular, and the plural paradigms are more likely. All of these schemas are of course assumed to be interconnected in a complex associative network of formatives. Figure 1 offers a tentative schema for the singular masculine definite article.

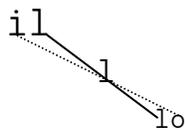


FIGURE 1: TENTATIVE MASCULINE SINGULAR DEFINITE ARTICLE SCHEMA.

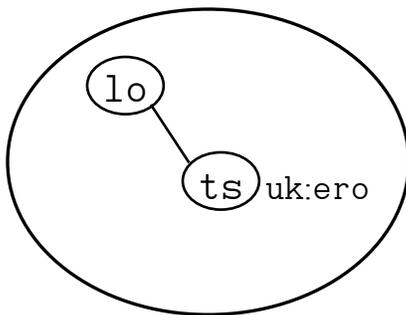
In Figure 1, solid lines represent stronger connections because of the exact correspondence between the segments (i.e., [l] to [l] to [l]), whereas dotted lines represent weaker connections (or even lack of connections) because of the inexact correspondence between segments. The difference in font size indicates different degrees of lexical strength, i.e., it relates to the frequency of each form.

The allomorph *il* represents the core of the category of masculine singular definite article, i.e., the prototype, as symbolized by the larger font in Figure 1. Because of its higher TOKEN frequencies it is considered the basic member. The higher token frequency of *il* follows because it shows up in a larger number of environments and, therefore, occurs as a unit more

frequently than the other forms. Compared to the other allomorphs, *il* would also be characterized by a higher TYPE frequency (i.e., the frequency of specific patterns) because it indeed represents the most common pattern for the masculine singular definite article. In view of its high token and type frequency, it is not surprising then that *il* shows the highest degree of productivity among the definite article allomorphs, i.e., that it is the form most likely to be selected with loan-words or novel formations (Rusci 2001).

Because definite articles (and determiners in general) do not occur in isolation, it is quite plausible to assume that they are not stored as independent lexical items but rather in association with (i.e., clustered to) the nouns and adjectives they modify. In other words, we can imagine that closely connected to the definite article schema/network are schemas of the possible segment clusters that can follow the articles.¹³ Thus *lo* would participate in a number of schemas involving the segments/clusters it selects, i.e., /s/ + C, /ʃ/, /ɲ/, /j/, /tʃ/, /dz/ etc. Some of these schemas, however, would be seldom accessed by speakers because they involve very low frequency items (for instance, *pneumatico* ‘tire’, *xilofono* ‘xylophone’). In other words, because of their lower degree of activation, they would be quite weak schemas to the extent that they might eventually lose the definite article connection and become simply schemas of lexical items, and speakers can end up associating them to *il*. However, *lo* will also partake in a number of considerably strong schemas involving very high frequency lexical items, such as *zucchero* ‘sugar’, *zio* ‘uncle’, *studente* ‘student’, *scemo* [ʃemo] ‘fool’ etc., and these lexical items will resist the intrusion of *il* because of the strength of their mental representation. Figure 2 illustrates differences in the strength of lexical representations involving *lo* contrasting a strong, stable representation (2)a with a weak representation (2)b, and also shows how the weak representation may be lost leading to new a new representation (2)b’ which will involve *il*.

a. Strong representation



¹³ Of course, schemas of possible preceding items would also occur, but they might be weaker because preceding lexical items do not form a constituent with the determiner.

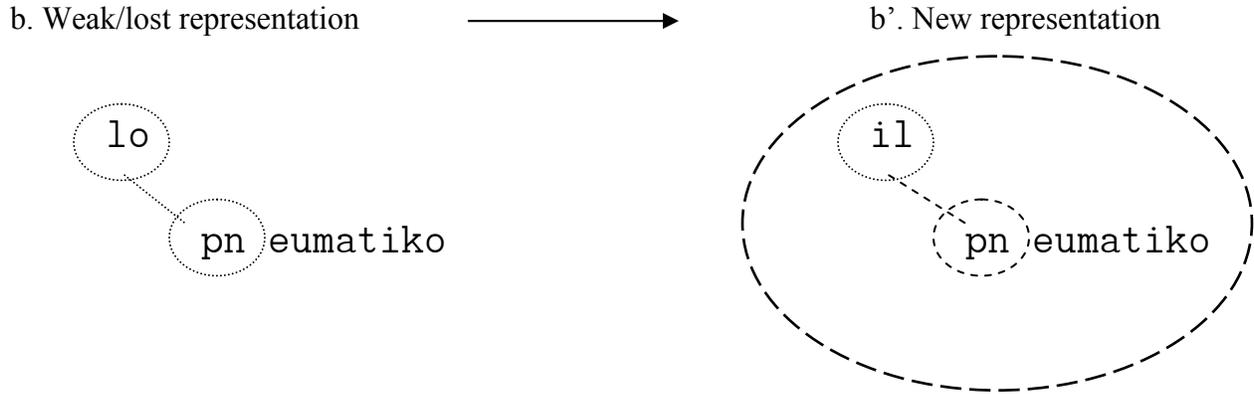


FIGURE 2: DIFFERENCES IN THE STRENGTH OF *LO* + LEXICAL ITEM MENTAL REPRESENTATION AND THE EMERGING OF NEW REPRESENTATION.

To conclude, the usage-based approach proposed by (Bybee 2001) applies quite nicely to the analysis of the distribution pattern of the Italian masculine definite articles. In particular, this approach provides a rather satisfactory account of the issues of (individual) variation within the synchronic pattern of distribution and higher selection of *il* over *lo*, which remains unaccounted for in a strictly phonological analysis.

5. ADVANTAGES OF A USAGE-BASED APPROACH.

This section discusses the advantages that a usage-based account of the allomorphy of the Italian masculine definite article can offer compared to traditional phonological analyses. The first advantage a usage-based analysis offers is empirical soundness, because dispenses with principles such the Sonority Hierarchy, etc., as well as features like extrasyllabicity. These are unappealing because of their high level of abstractness and because they can account only (and in any case, partially) for a completely static (quite unrealistic) stage of the language, in which deviation from the rules is not predicted. Also, it eliminates the problems of which allomorph is to be posited as rule input and the subsequent implausible rules of the derivation for either input. The most important advantage that can be attributed to the usage-based model is that it satisfactorily accounts for the instances of “ungrammatical” selection of *il* discussed in section 5. Finally, a third advantage is that a usage-based approach might be able to account for why *il* did not take over *lo* in all environments (a diachronic change) by making reference to different levels of frequency and of lexical strength between the segments/clusters that require *lo* and those that select *il*. Note that, if this proves true, it would mean that the same model adopted for the synchronic analysis can be extended to the diachronic analysis; that is, the synchronic account becomes consistent with the diachronic changes and also contributes to their explanation.

6. CONCLUSION.

In this paper, I reviewed how generative phonology accounts for the allomorphy of the Italian masculine definite article and showed how purely phonological analyses are not fully satisfactory, especially with respect to the input of the rules, the nature of the rules of derivation

of the different allomorphs, and the environment in which the rules apply. Furthermore, I pointed out how traditional phonological analyses often depend too greatly on abstract and empirically questionable principles. Conversely, I argued that the usage-based framework proposed by Bybee (2001) can successfully be applied to the analysis of the distribution of the allomorphs of the Italian masculine definite article and that a usage based account appears to give new insights to the phenomenon, in particular with respect to individual variation and possible changes that can be observed in the current distribution pattern.

REFERENCES

- Browman, Catherine, and Louis Goldstein. 1992. Articulatory Phonology: An Overview. *Phonetica* 49. 155-80.
- Bybee, Joan. 2001. *Phonology and Language Use*. Cambridge: Cambridge University Press.
- Davis, Stuart. 1990. Italian Onset Structure and the Distribution of *il* and *lo*. *Linguistics* 28. 43-55.
- Dressler, Wolfgang. 1984. On the Definite Austrian and Italian Articles. In *Phonemorphology*, ed. by Edmund Gussmann, 35-47. Lublin: Catholic University.
- Haiman, John. 1994. Ritualization and the Development of Language. In *Perspectives on Grammaticalization*, ed. by William Pagliuca, 3-28. Amsterdam/Philadelphia: John Benjamins.
- Marotta, Giovanna. 1993. Selezione dell'Articolo e Sillaba in Italiano: Un'Interazione Totale? *Studi di Grammatica Italiana* 15. 255-96.
- Muljačić, Žarko. 1971. Gli Allofoni /il/, /lo/ e /l/ e la Fonologia Jakobsoniana. *Lingua Nostra* 32. 82-4.
- Muljačić, Žarko. 1974. Ancora sulla Forma dell'Articolo Determinativo Italiano. *Italica* 51. 68-71.
- Ohala, John. 1992. Alternatives to the Sonority Hierarchy for Explaining Segmental Sequential Constraint. In *Papers from the Parasession on the Syllable*, 319-38. Chicago: Chicago Linguistic Society.
- Pagliuca, William, and Richard Mowrey. 1987. Articulatory Evolution. In *Papers from the 7th International Conference on Historical Linguistics*, ed. by Anna Giacalone Ramat, Onofrio Carruba, and Giuliano Bernini, 459-72. Amsterdam/Philadelphia: John Benjamins.
- Radzinski, D. 1987. On the Distribution of Articles in Italian. *Penn Review of Linguistics* 11. 88-100.
- Romeo, Luigi. 1969. Notes on the Morpho-Syntax of the Italian Article. *Lingua* 23. 135-43.
- Russi, Cinzia. 2001. On the Allomorphy of the Italian Masculine Definite Article. M.A. Thesis, University of Washington.
- Steriade, Donca. 1982. Greek Prosodies and the Nature of Syllabification. Unpublished Ph.D. Dissertation, MIT.
- Vanelli, Laura. 1992. Da "lo" a "il". *Rivista Italiana di Dialettologia* 16. 29-66.

TOWARD AUTOMATED SCENE GENERATION FROM TEXTUAL DESCRIPTIONS*

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1. INTRODUCTION.

Language communicates descriptions of the world. Humans can decompose a complex visual scene into salient details, represent it with relatively few words, transmit it in written or verbal form, and then effortlessly reconstruct it with high fidelity. Very little information is actually stated, so humans rely heavily on commonsense knowledge and reasoning to fill in the gaps (Pinker 1994:81, Calvin 1996:78). Together, this explicit and implicit information helps the receiver build and manipulate a corresponding mental image of the scene.

Text understanding by computers is generally limited to superficial processing of grammar and vocabulary. As such, most computational-linguistics systems overlook subtle yet essential aspects of language. The prototype system described herein works toward bridging the gap between humans and computers in language processing. It draws upon and tests concepts from linguistics, psychology, cognitive science, and computer science to convert restricted textual descriptions into plausible visual interpretations by graphically rendering them in a simplistic virtual-reality environment.

2. BACKGROUND.

Most of the work in this area addresses the problem of converting pictures to textual descriptions. This effort is likely driven by the need for search engines like Google and Yahoo to index pictures on the World Wide Web; however, there are a few systems similar to this prototype system that convert textual descriptions to pictures. WordsEye (Coyne and Sproat 2001) and CarSim (Egges et al. 2001), which are tools for multimedia animation and automobile accident analysis, respectively, are examples.

Unlike these two applications, however, which are designed to solve specific problems, this prototype system focuses instead on developing and evaluating hypotheses about the steps taken in reaching a solution; as such, it is not tailored to any particular problem. The emphasis is on psycholinguistics and computational linguistics. The psycholinguistic side investigates both psychological issues, such as the mental representations and processing mechanisms involved in the comprehension and visualization of image-rich text, as well as the linguistic issues of how language conveys this information. The computational linguistics side investigates ways to emulate these aspects of language use with computers.

2.1 PSYCHOLOGICAL ISSUES.

The brain is phenomenal at performing the commonsense mental gymnastics required to interpret descriptions visually. Of particular interest here is what it determines to be relevant and how such decisions contribute to making a plausible interpretation. The brain is believed to build an internal representation of a scene. This so-called MENTAL MODEL or IMAGE may provide a framework for augmenting the explicit details specified in a description with implicit information

* This work is supported in part by NSF grants CISE MII EIA-9810732 and EIA-0220590.

a person already knows (Pinker 1997:284, 295, Markham 1999:254, Calvin 1996:61). The model may also provide an appropriate context for further mental processing on two scales. On the smaller scale, the individual objects in a scene have their own contexts; e.g., dogs are animals usually kept as pets and given endearing names; whereas, houses are nameless, inanimate structures. On the larger scale, the combination of a dog and house may comprise a bigger picture of, say, a yard, for which further implicit information could be accessed. This prototype system considers these psychological processes from a practical, action-oriented perspective; i.e., what they do as opposed to how they do it. Such a view is common in computational work because the internal mechanisms of the brain are too complex and poorly understood to map directly into a computer.

2.2 LINGUISTICS ISSUES.

The linguistic emphasis for this prototype system is on four lexical-semantic issues that are hypothesized to play the major roles in the description of a scene: UNDERSPECIFICATION, AMBIGUITY, VAGUENESS, and UNCERTAINTY. Each is considered in terms of both its semantics, which is independent of context, and its pragmatics, which is dependent. Unfortunately, this artificial breakout is not entirely representative of the real world, where the distinctions are often hopelessly blurred. For the sake of practicality, however, they are addressed separately here.

2.2.1 UNDERSPECIFICATION.

Very little information is explicitly stated in a description, normally just the gist. The remaining information is filled in by mental reasoning over background knowledge shared between the transmitter and the receiver (Pinker 1994:81, Allen 1995:546). For example, the existential proposition *there is a large dog* contains just two pieces of explicit information: the object and its size.¹ However, the receiver immediately interprets them within the context of what he or she knows about dogs; e.g., they are four-legged animals with a particular range of size; they are hairy; they are mortal beings; they do not talk or fly; and so on. These implicit background details augment the explicit ones, and together they support a corresponding mental model of the description. Without the implicit contribution, the description has no meaning beyond the overt definitions of its words.

2.2.2 AMBIGUITY.

Most words share more than one meaning. The meanings may refer to completely different concepts (e.g., *crane* as either a bird or a piece of equipment) or to subtle variations within the same concept (e.g., *big* in height, width, depth, etc.) For this prototype system, the latter ambiguity is targeted for automated processing; whereas, the former is resolved manually (see Section 3.1.2). Variations within the same concept are most common with adjectives because they can modify a wide range of nouns in many ways (Jannedy et al. 1994:224). For instance, while the basic context-independent meaning of *big* is understood to reflect a measure of relatively great size, the particular units of measurement are often highly context-dependent as illustrated in Table 1. Obviously, interpreting the ambiguous context of an adjective is essential to rendering its use in a scene correctly.

¹ The claim of existence itself could be considered a third.

Context	Measure
Tree	Height
Lake	Area
Bridge	Length
Canyon	Width
Mountain	Volume
Border	Perimeter

TABLE 1: SOME PRAGMATIC MEANINGS OF *BIG*

2.2.3 VAGUENESS.

Even meanings with identical units of measurement may vary when compared across different contexts (Allen 1995:232, Jannedy et al. 1994:228). For example, *small* and *big* refer to generic volume in essentially the same way for both a dog and an ant; i.e., *small* indicates less volume than *big* does. Therefore, a *small dog* has less volume than a *big dog*; likewise a *small ant* has less volume than a *big ant*. However, by blindly following this line of reasoning further, a *small dog* can actually be interpreted as having less volume than a *big ant*!

2.2.4 UNCERTAINTY.

The combination of underspecification, ambiguity, and vagueness leaves much unsaid and unknown in any description. Even when adequate background details have been supplied, the context is known, and the units of measurement have been resolved, it is rarely possible to commit to any particular interpretation as being the most correct one; e.g., is a *tall* tree 50 feet or 100 feet high? In fact, any number of interpretations can be considered equally valid. Indeed, humans, with arguably innate abilities to perform incredible mental processing, often have differing opinions about how to render a description visually. The goal of this prototype system is not to produce some theoretically perfect rendering of a scene. Rather, its two goals are (1) to entertain a range of viable alternative interpretations and (2) to discard incorrect ones.

3. COMPUTATIONAL ISSUES.

All computation follows the same model of receiving input, processing it in some application-specific way, and generating output as the result. The remainder of this paper is organized accordingly.

3.1 INPUT.

The first computational step in this prototype system is to transfer a written English description into the computer in a form that can be processed. Machines are far less adaptable to variation and less tolerant of error than people are. Therefore, this step must be precisely defined and carefully executed.

3.1.1 SCENE DESCRIPTION.

Language can describe anything in the universe. While the human brain can obviously process such complexity, computers do not yet come remotely close to this level of performance (Pinker 1994:28). To accommodate this limitation and to maintain focus on the stated issues of this investigation, this prototype restricts and simplifies the contents of descriptions to cartoon-like snapshots of the outside world such as those of (1a) and (1b).

- (1) a. *A brown dog is at the left rear of a house that has a large pine tree to its right.*
 b. *The dog is walking toward the front yard.*

Descriptions are restricted to physical objects like dog or house, apparent properties like big or small, spatial relations like above or near, and miscellaneous intensifiers like directly or very. These must have concrete meanings with well-defined visual renderings; abstract, conceptual, or figurative meanings like love, intelligence, age, speed, etc., are not supported. Furthermore, movement in a snapshot is merely implied. Therefore, for the snapshot described in (1b), the dog faces the front yard but remains motionless.

3.1.2 ANALYSIS AND TRANSLATION.

The surface structure of any description can vary widely without appreciably changing the meaning. Because parsing is another aspect of language that computers do not perform well, translation from English to a roughly equivalent formalism known as LOGICAL FORM is performed by hand (Pinker 1994:80, 201, 209). Examples (2a) through (2c) show a likely translation for examples (1a) and (1b).

- (2) a. (DOG d) (HOUSE h) (FRONT-YARD f) (PINE-TREE t)
 b. (BROWN d) (LARGE t)
 c. (BEHIND-LEFT d h) (FACING d f) (RIGHT t h)

This step allows a person to analyze the content of a description and commit to an initial interpretation (e.g., Should a crane be translated as CRANE-BIRD or CRANE-EQUIPMENT?) instead of allowing the computer to make poor choices that would propagate throughout and degrade the remainder of the processing (Pinker 1994:207). It also verifies that none of the restrictions specified in 3.1.1 are violated.

A logical form simplifies machine processing (Allen 1995:14, 228). It is syntactically unambiguous and can be manipulated automatically without unnecessary difficulty or confusion. For example, coreference and prepositional phrase attachment—notoriously difficult computational problems—are completely resolved in translation because a human must commit to their interpretation. The algebraic notation of the logical form formally links the components of a description in the same way that subscripts or the branches of a parse tree would in linguistic analyses. In (2a), the objects are assigned the arbitrary labels d, h, f, and t, which are then used by the properties in (2b) and the relations in (2c). For clarity, a back-translation is shown in (3a) through (3c). Notice that the original meaning is preserved, but not necessarily the original structure.

- (3) a. *There is a dog, a house, a front yard, and a pine tree.*
- b. *The dog is brown, and the pine tree is large.*
- c. *The dog is behind and left of the house and facing the front yard; the tree is to the right of the house.*

In a completely automated system, analysis and translation would not be done manually. However, in a testbed environment such as the prototype system documented here, this intervention controls experimental unknowns and downplays difficult issues.

3.2 PROCESSING.

Once the input is in a form the computer can manipulate (logical form), human intervention is no longer necessary: all remaining decisions, commitments, etc., are now solely the computer’s responsibility. The following computational steps are applied, and solutions are evaluated.

3.2.1 SCENE DECOMPOSITION.

The logical form of a description lays the foundation for automated processing. However, as previously discussed (2.2.1), substantial background information must still be provided. To accommodate merging the explicit information provided by the logical form and this implicit (background) information into the same representation, the logical form is automatically converted to an equivalent form known as a CONCEPTUAL GRAPH (Sowa 2000:476). Figure 1 shows the conceptual graph created for the logical form of (2a) through (2c).

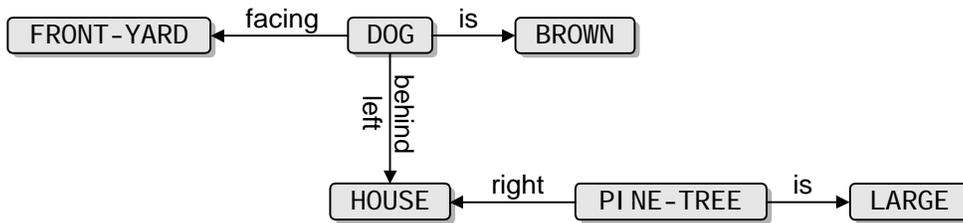


FIGURE 1: CONCEPTUAL GRAPH FOR (2a-c).

A conceptual graph can be considered a form of linguistic parse tree (Sowa 2000:429, 467, Baumgartner and Payr 1995:115): its meaning is defined by both its contents and its structure, and its objects and properties (boxes) and relations (arrows) have the linguistic counterparts nouns, adjectives, and prepositions, respectively. Similarly, new constituents can be added almost anywhere to expand the meaning thus narrowing the interpretation.

3.2.2 KNOWLEDGE STORAGE.

The background knowledge required to resolve issues of underspecification, ambiguity, vagueness, and uncertainty must be stored for retrieval. This type of storage is similar to human long-term memory (Markham 1999:116, Pinker 1997:137). A computational storehouse known as a KNOWLEDGE BASE is used in this prototype system. Unlike the human mind, however, everything to be stored in the knowledge base must be painstakingly programmed by hand, which limits the breadth and depth of coverage (Baumgartner and Payr 1995:17); i.e., how many different pieces of knowledge and how much detail. This prototype system settles for a reasonable balance over a small set of representative examples, with the understanding that more could be added later.

Knowledge is considered in two forms here:

- QUANTITATIVE KNOWLEDGE consists of relatively precise, unambiguous, numerical measurements such as 2 inches wide, 80 feet high, 10 pounds, etc. Also included are closed sets of required elements; e.g., a cube must have top, bottom, front, back, left, and right faces.
- QUALITATIVE KNOWLEDGE consists of imprecise, subjective details such as narrow, high, heavy, etc. Also included are loosely defined concepts like the region in front of or in back of something, etc.

Although quantitative knowledge is easier to process computationally, not much in the world can be specified in this way absolutely enough for practical use. For example, there are no standard dimensions for a house. Instead, it is often more reasonable to specify qualitative measures in relative terms, such as “an object is higher than it is deep and wider than it is high on average”.

These two forms are combined with respect to the objects in a description. For example, quantitative knowledge could specify that a house must have at minimum a front, back, left side, right side, top, and bottom, and the latter must be oriented downward, etc. Qualitative knowledge could specify that the front normally faces forward, and anything considered in front of a house should find itself within a three-dimensional region where some locations are more probable than others; e.g., near is more likely than far, straight in front is more likely than off at an angle, etc. The knowledge base is implemented as a SEMANTIC NETWORK of related details (Markham 1999:91).

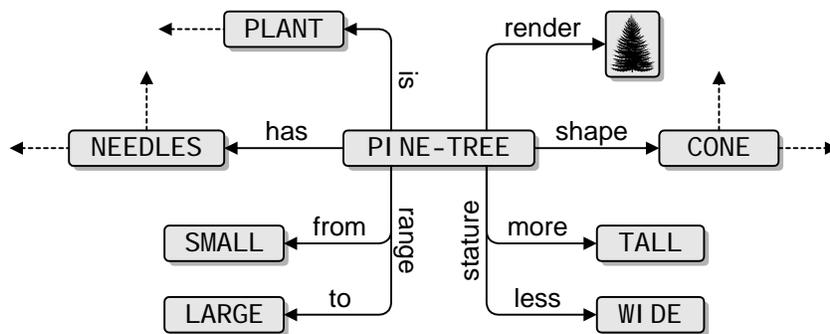


FIGURE 2: SEMANTIC NETWORK OF A PINE TREE.

The semantic network for a pine tree is shown in Figure 2. Implicit knowledge is extracted from a semantic network by following any number of arrows from a starting point and accumulating whatever is encountered along the way. For example, the semantic network for PINE-TREE (Figure 2) establishes that it is a form of TREE shaped like a CONE with NEEDLES. It further establishes that a TREE is a PLANT ranging in size from SMALL to LARGE and tending to be more TALL than WIDE, etc. This process corresponds closely with spreading activation, which is how the human mind is believed to use associative memory to link related information (Pinker 1997:104, Jannedy et al. 1994:291, Markham 1999:94, 116). Representative visual components like the tree pictograph may also be stored in the semantic network for rendering (see Figure 2).

The semantic network uses the same formalism as the conceptual graph. As a result, semantic networks and conceptual graphs can be merged in a straightforward manner, thereby augmenting the explicit details in the latter with the implicit details in the former. Differences or conflicts can also be reconciled at this time (Pinker 1997:290, Sowa 2000:454).

3.2.3 GEOMETRIC REASONING.

Knowledge alone is of little use if it cannot be manipulated properly. The brain manipulates knowledge through complex reasoning mechanisms that are far beyond current understanding. This prototype system attempts to mimic the small part of these reasoning mechanisms that are hypothesized to play the greatest roles in knowledge manipulation. Reasoning is used here to figure out the visual context for a scene and each of its objects. It can be considered a problem of loose constraint satisfaction over generalized degrees of how true something is (Markham 1999:73). The goal of constraint satisfaction is to find a solution that meets as many requirements as best as possible (Dale et al. 2000:801, 808, Pinker 1997:105, Calvin 1996:81, Xu et al. 2002). Truth here is difficult to define because, as humans demonstrate, no single interpretation exists for a description. Moreover, from the multiple possible interpretations, rarely can one be considered the best. Luckily, semi-predictable commonalities can often be extracted (Markham 1999:131). This relatively safe middle ground is exploited by reasoning over five classes of constraints:

- REQUIRED ELEMENTS must be present; e.g., an object with a front side must have a front region, which may be either generic, like the area in front of a tree, or named, like a front yard.
- OPTIONAL ELEMENTS may be present but are not required; e.g., a house may have a swimming pool, which, if present, should be found in the back region of the house unless otherwise specified.
- IMPLIED ELEMENTS are assumed present even if they are not specified; e.g., a car in front of a house should be parked on a driveway or street.
- RESTRICTED ELEMENTS must not be present or associated in a certain way; e.g., a swimming pool cannot be in a driveway. This type of constraint is difficult to specify because so many combinations of elements are unlikely, ridiculous, etc.
- NEUTRAL ELEMENTS are things that do not fit into the other classes; e.g., a helicopter in a front yard is not required, expected, assumed, or prohibited. In other words, its presence plays no particular role and cannot be accounted for in advance.

Consider reasoning over the logical form in Figure 1. Nothing specifies that the front yard is associated with the house. In order to make this commonsense connection, constraints must be satisfied. Thus, if a house may optionally have a front yard, and a front yard is present, then they can be associated without ambiguity. However, if two houses were described, additional reasoning would be necessary to decide which is more suitable to accept the yard. A restricted constraint could specify that two houses should not share the same yard.

Similar reasoning is done over other spatial and geometric issues. The location of each object is especially important, as is its orientation; e.g., the front of a house faces forward. Similarly, composite objects must attach correctly; e.g., a garage normally attaches to the side of a house but never to the top or bottom.

FRAME OF REFERENCE, a spatial form of deixis, is a very a difficult problem because it often depends on the location of the person writing the description (Markham 1999:178, 186). For example, if a dog is in front of a house, then it should normally be in front of the front side of the house; i.e., in the front yard. The dog's location in front of a tree, on the other hand, is unclear because trees do not have a canonical front or associated named regions. In this case, it is actually between the tree and the writer, whose location is usually unknown.

Finally, vagueness must be accounted for to ensure that the objects are scaled properly in relative size. This prototype system uses a scheme derived from Reichenbach's (1947) classic temporal-interval relations (Allen 1995:410). In the knowledge base, the dimensional properties of any object are assigned an estimated interval from minimum to maximum over the appropriate unit of measurement; e.g., smallest to largest, lightest to heaviest, etc. Two different objects can thus be compared by aligning their different intervals as illustrated in Figure 3. For example, a lower-bounded comparison of height indicates that objects A and B both have the same least height, but their greatest heights differ. Therefore, a tall A is actually higher than a tall B.

Type	Interval Relations
Disjoined	
Conjoined	
Equal	
Overlapping	
Lower-Bounded	
Upper-Bounded	
Contained	

FIGURE 3: VAGUENESS INTERVALS.

3.3 OUTPUT.

The final computational step for this prototype system is to render the result as a simplistic, three-dimensional, interactive, virtual world on the computer screen as illustrated in Figure 4. The user, who views the world as though he or she were in it, can look in any direction and walk or fly anywhere except into objects. This adjustable perspective allows all aspects of the world to be viewed and their consistency with the original description to be verified.



FIGURE 4: PLAUSIBLE GENERATED SCENE.

As a testbed environment, this prototype system also allows the user to interact with the objects to view and even modify their internal details. For instance, clicking the dog brings up its portion of the conceptual graph and various details about how it was processed. If these are changed, the appropriate processing stages are automatically executed again, and the scene is updated immediately. This facilitates testing hypotheses on the fly by adjusting their conditions and observing the results (Sowa 2000:365).

Finally, it is difficult or even impossible to render conflicting interpretations simultaneously (Pinker 1997:294, 106). For example, if the dog is on the side of the house, then it could be on either the left or right side. Because even a human cannot interpret this further, two parallel worlds are generated. They are displayed one at a time and can be alternated for comparison purposes.

4. CONCLUSION.

This paper has presented an overview of issues and hypothesized solutions in processing image-rich textual descriptions. As a work in progress, the system it describes does not yet fully implement the framework laid out. Consequently, there are few empirical results to report at this time. Nevertheless, preliminary findings do show great promise, and additional work will investigate these points further.

REFERENCES

- Allen, James. 1995. *Natural Language Understanding*. Redwood City, CA: Benjamin/Cummings.
- Baumgartner, Peter, and Sabine Payr. 1995. *Speaking Minds: Interviews with Twenty Eminent Cognitive Scientists*. Princeton, NJ: Princeton University Press.

- Calvin, William. 1996. *How Brains Think*. New York: Basic Books.
- Coyne, Bob, and Richard Sproat. 2001. "WordsEye: An Automatic Text-to-Scene Conversion System." Paper presented at SigGraph Annual Meeting, Los Angeles, CA.
- Dale, Robert, Hermann Moisl, and Harold Somers (eds.) 2000. *Handbook of Natural Language Processing*. New York: Dekker.
- Egges, Arjan, Anton Nijholt, and Pierre Nugues. 2001. *CarSim: Automatic 3D Scene Generation for a Car Accident*. Technical Report. University of Twente.
- Jannedy, Stephanie, Robert Poletto, and Tracey Weldon (eds.) 1994. *Language Files: Materials for an Introduction to Language and Linguistics*. Columbus: Ohio State University.
- Markham, Arthur B. 1999. *Knowledge Representation*. Mahwah, NJ: Lawrence Erlbaum.
- Pinker, Steven. 1994. *The Language Instinct: How the Mind Creates Language*. New York: William Morrow.
- Pinker, Steven. 1997. *How the Mind Works*. New York: W.W. Norton.
- Reichenbach, Hans. 1947. *Elements of Symbolic Logic*. New York: McMillan.
- Sowa, John. 2000. *Knowledge Representation: Logical, Philosophical, and Computational Foundations*. Pacific Grove, CA: Brooks/Cole.
- Xu, Ken, James Steward, and Eugene Fiume. 2002. "Constraint-based Automatic Placement for Scene Composition." Paper presented at Graphics Interface Annual Meeting, Calgary, Alberta.

CONNECTING LEXICAL KNOWLEDGE TO DISTRIBUTED REAL-WORLD KNOWLEDGE IN THE SEMANTIC WEB

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1. INTRODUCTION.

Often, something that might be regarded as obvious may sound amusing or completely counter-intuitive, especially if the listener has not yet completely internalised the language. For example, it is not self-evident for a novice language learner how to conceptualise a sentence such as (1):

- (1) The author, *The Racing Times* contributing editor, Shirley Smith, is writing a book on the horse.

Nor is it obvious to a translation application of the current standards. The ambiguity arises in trying to decide whether Shirley Smith is writing a book about the horse, or whether she is writing a book while seated on the horse, or whether she is writing a book that rests on a horse. A native English speaker wouldn't have any problem in interpreting it the way intended, nor would he or she hesitate in rejecting (2) as incorrect, although a translation application might process it without a further ado:

- (2) The horse, *The Racing Times* contributing author, Shirley Smith, is writing a book on the editor.

In (1), the context plays a prominent part in its acceptance, whereas (2) should be rejected on the basis of real-world knowledge; i.e., horses do not write books. Real-world knowledge is made up of myriads of everyday facts and their relationships. Without this knowledge it is practically impossible to make sense of the world when we communicate with each other. However, unlike syntax, pragmatics, and semantics, real-world knowledge is not linguistic knowledge. For this reason, it has proved problematic for linguists attempting to incorporate the required knowledge about language use into lexical entries.

Various attempts to create real-world databases have been made and are underway to address this and other problems. Lenat's (1995) CYC, a massive database of real-world knowledge under painstaking construction for the last two decades, has been criticised by Yuret (1997), among others, as being too explicit in its representation of knowledge in a single uniform framework and for using deduction as its main inference method. Locke (1990) warns about the dangers of creating systems that are accessible only to experts. To avoid the threat of 'ontological imperialism' the Semantic Web with its distributed ontologies and technologies seems a better alternative. XML-coded and RDF-Schema-based knowledge representation languages such as OIL and DAML-OIL and their future extensions (Fensel et al. 2001), with their increasing inference capabilities, are suitable for domain-specific, distributed ontology representation of real-world knowledge. If a larger centralized database is eventually needed,

then Suggested Upper Merged Ontology (SUMO) could be used to unify disparate Semantic Web ontologies as discussed in (Pease et al. 2002).

This paper investigates the possibility of connecting distributed, real-world ontologies in the Semantic Web to linguistic knowledge (syntactic-pragmatic-semantic). RDF-based, real-world knowledge in the Semantic Web and elsewhere is divided into many distinct domain ontologies. How to utilize this growing repository of ontological, real-world knowledge for the purpose of disambiguation is the main topic of this article.

One way to go about utilizing this growing repository is by directly aligning lexical ontologies formed by semantic sorts (Dölling 1995) with the ontologies in the Semantic Web. Here, we use the Head-Driven Phrase Structure Grammar (HPSG) formalism to exemplify this. Jackendoff's (1983, 1990) two-tier lexical conceptual structure (LCS) is mapped to HPSG semantic sorts using methodology derived from Androutsopoulos and Dale (2000). These semantic sorts, forming an upper ontology, can then be mapped to distributed, real-world ontologies in the Semantic Web. This mapping is based on semantic similarity measures similar to those used by O'Hara et al. (1998). As a result, real-world knowledge, together with semantics, syntax, and pragmatics, can be integrated to constrain the structure-shared lexical entries.

Another way to accomplish the integration of real-world knowledge with lexical entries would be to use SUMO as a go-between to align semantic sorts with distributed real-world ontologies. This approach is considered only briefly: depending on the development of the Semantic Web, this approach might prove more viable in the long run.

The main motivation behind this research is to improve the accuracy of linguistic parsers to benefit linguistic applications used in translation, language learning, and other tasks that use parsers for disambiguation. Current parsing applications might seem adequate for these purposes having reached accuracies close to 100 % as demonstrated by Tapanainen and Voutilainen (1994). However, a word-based disambiguation error rate as small as 4 % is high enough to completely change the meaning of an average-length sentence, translating into a 56% per-sentence error rate (Abney 1996). Deployment of real-world knowledge together with linguistic knowledge in disambiguation will help to bridge this gap. As the expanding repository of that knowledge, the Semantic Web should be exploited.

2. HEAD-DRIVEN PHRASE STRUCTURE GRAMMAR (HPSG).

HPSG (Pollard and Sag 1995) is an integrated theory of natural language syntax and semantics drawing upon theories such as Categorical Grammar (CG) and Generalized Phrase Structure Grammar (GPSG) among others. Situation semantics and computer science have also contributed to its formulation. Unlike the transformational government-binding theory (GB) (Chomsky 1982), HPSG is NONDERIVATIONAL: its attributes of linguistic structure are related by STRUCTURE SHARING and not by transformational operations as they are in GB. The DECLARATIVE SYSTEM OF CONSTRAINTS employed in developing grammars based on HPSG ensures process neutrality; i.e., comprehension and production models are order-independent, because the constructs of these grammars can be applied in any required order. The principal type of object in HPSG is a SIGN (a word or a phrase) represented as a feature structure in an attribute-value matrix as shown in Figures 1 through 4.

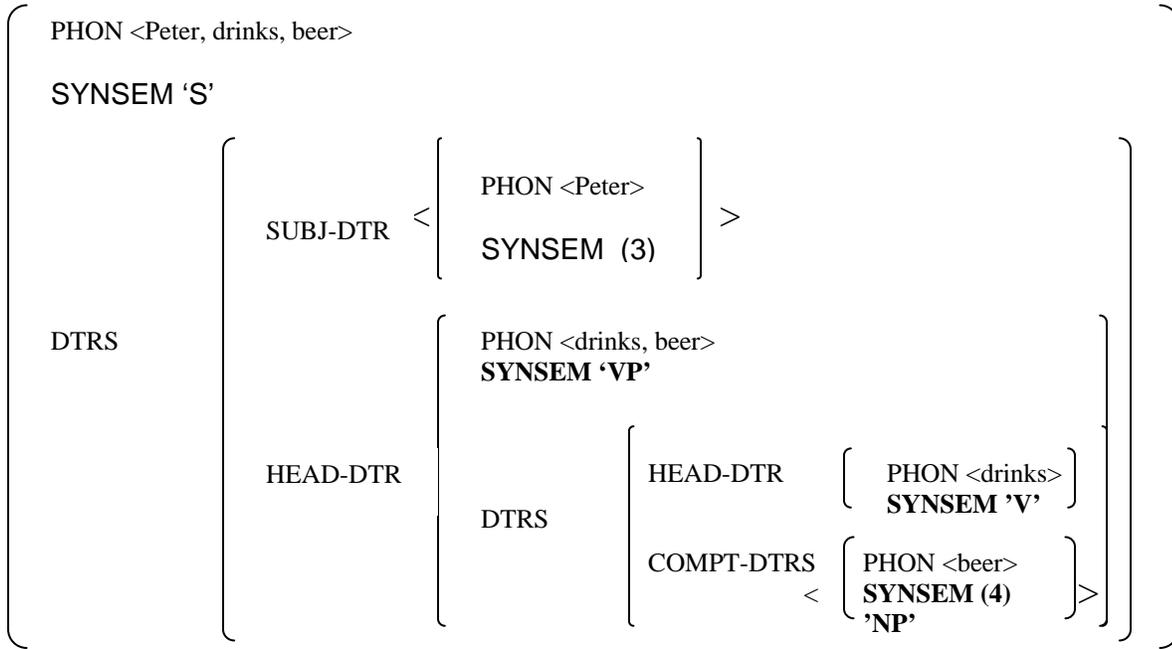


FIGURE 1: BASIC STRUCTURE OF HPSG SIGN.

The SYNSEM structures (DTRS: 3NP, 4NP, and VP) of Figure 1 are shown in more detail in Figures 2 through 4.

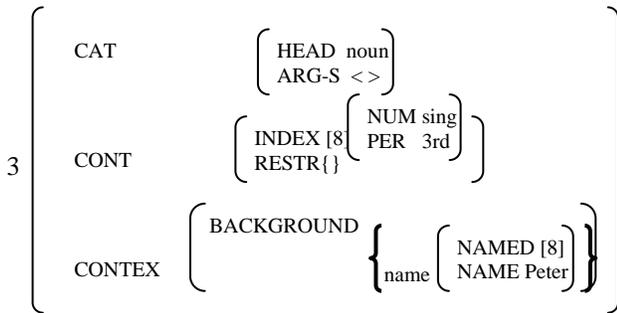


FIGURE 2: SUBJ-DTR 'PETER' IN SYNSEM .

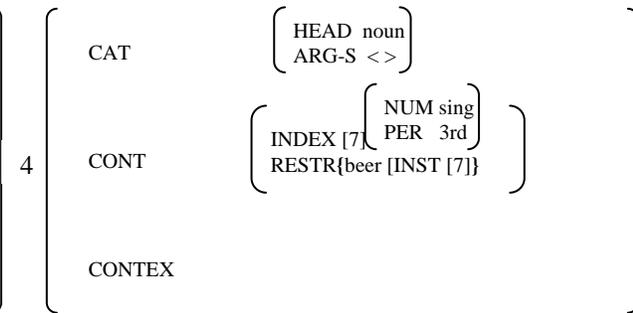


FIGURE 3: COMPT-DTRS 'BEER' IN SYNSEM .

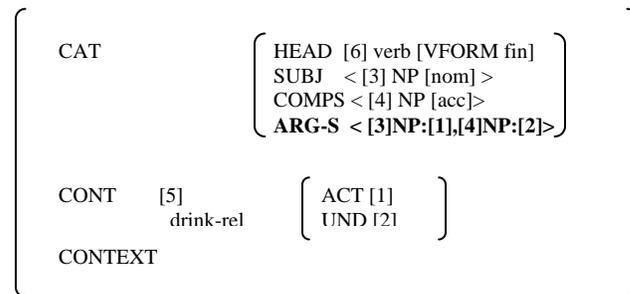


FIGURE 4: HEAD-DTR 'DRINKS' IN SYNSEM [V].

FIGURE 4: HEAD-DTR 'DRINKS' IN SYNSEM [V].

Here we will give just a brief account of the Figure 1 details relevant to this article. For a more detailed explanation, refer to (Pollard and Sag 1995) and (Davis 1997). Daughters (DTRS) are used in combinatorial saturation with the head as specified in the head's CATEGORY, which is part of the local syntax-semantics (SYNSEM) attribute. SYNSEM (Figures 2 through 4) consists of (1) CATEGORY, (2) CONTENT, (3) CONTEXT.

Roughly speaking, CATEGORY might be regarded as the syntactic component with its grammatical arguments, CONTENT as the semantic component, and CONTEXT as its pragmatic component/interface with a semantic dimension.

The verb *drinks* in Figure 1 acts as the HEAD of the phrase and forms part of the following CATEGORY composition:

HEAD	verb [fin]	(drinks)
SUBJ	< [3]NP[nom] >	(→Peter)
COMPS	< [4]NP[acc] >	(→beer)
ARG-S	< [3]NP:[1],[4]NP:[2] >	(→Peter, → beer)

SUBJ (subject list) and COMPS (complements list) are known as valence features, combining syntactically with the head in a combinatorial saturation. ARG-S (argument structure list), a concatenation of the SUBJ and COMPS lists, corresponds to the hierarchical argument structure of the predicate. The order of the arguments in ARG-S is related to their relative obliqueness with the least oblique argument occupying the leftmost position as follows:

subj < dir_obj < indir_obj < oblique_comp

To be of any use in cross-linguistic applications, the ARG-S structure in HSPG would have to be adapted to this hierarchy accordingly, for example, by using Schema 3 as detailed in (Pollard and Sag 1995:40). In Finnish, for example, the argument obliqueness does not usually conform to this positional hierarchy but is determined morphologically by the case endings. In the specification of ARG-S, the number after the colon indicates the content of the arguments, which, in this case, are shared with ACT and UND (Figure 4). ACT and UND are Davis's modifications to HPSG and to Jackendoff's (1983, 1990) conceptual structures. We take a closer look at these and the semantical nature of CONTENT in the following section, and deal with the pragmatics of CONTEXT after that.

3. LEXICAL CONCEPTUAL STRUCTURES.

CONCEPTUAL STRUCTURES can be understood as those structures of mind that have developed in living organisms during their evolution in interactions with the changing environmental conditions. These structures are reflected in the semantics and are partially captured in the syntax of a natural language. However, natural language is, by no means, the only expression of those conceptual structures: all of the other senses (hearing, vision, etc.) employ the same structures. The value of these structures lies in their universality: languages may vary, but as all the human beings have presumably similar evolutionary development behind them,

conceptual structures should vary very little from region to region and between individuals. This gives us hope that *some* universal semantic structures encoded in syntax may, in fact, be found in all languages and could be employed productively in many natural language processing tasks such as language learning and translation.

Jackendoff's theory of semantic structures (Jackendoff 1990) or Lexical Conceptual Structures (LCS) being connected with conceptual structures is testable in the sense that if conceptual structures follow the universality constraint as claimed, then, for example, mapping the model of his semantic structures from one language to another should be possible, at least at a coarse level. The concepts and primitives he uses, although well structured, are still malleable for further elaborations as shown by Davis (1995), Verspoor (1997), and Wiese (2001) among others. Even though it might be possible to use only a part of these assumed universal conceptual structures, one could use ad hoc semantic struts and prostheses to temporarily replace those structures still not discovered or found to be erroneous. Jackendoff maps each major syntactic constituent of a sentence and the sentence itself into a conceptual constituent in the meaning of that sentence. His function-argument constituent categories include THING, EVENT, STATE, ACTION, PLACE, PATH, PROPERTY, and AMOUNT. This is illustrated by example (3):

(3) *Peter walked toward the sea.*

In (3) *Peter* and *the sea* are mapped to THING constituents, *toward the sea* to a PATH constituent, and the whole sentence to an EVENT constituent.. Jackendoff (1983:166) exemplifies another aspect of his theory with (4). This ambiguous sentence, then,

(4) *The mouse ran under the table.*

needs three different representations for its differing senses to make it unambiguous:

1. [_{Path} TO ([_{Place} UNDER([_{Thing} TABLE])))] (goal)
2. [_{Path} VIA ([_{Place} UNDER([_{Thing} TABLE])))] (path)
3. [_{Place} UNDER([_{Thing} TABLE])] (location)

This sentence is ambiguous in English and has three interpretations. In the first interpretation the mouse goes under the table (goal). In the second, the mouse passes under the table and to the other side of it (path). In the third, the mouse moves around under the table (location). In Finnish, these ambiguities are resolved with the help of case endings as shown in (5 a-c):

- (5)
- | | | |
|----|---|------------|
| a. | <i>Hiiri juoksi pöydän alle.</i> | (goal) |
| b. | <i>Hiiri juoksi pöydän alta/ali/alitse.</i> | (path) |
| c. | <i>Hiiri juoksi pöydän alla.</i> | (location) |

Apart from lending support to the validity of Jackendoff's basic ideas, these sort of comparisons might help to hone the structures more suitable for cross-linguistic use. As far as the case endings and other grammatical constructs are concerned, they can be taken care of within the functions. For example, *alla* 'under' could be modified within the TO or VIA function to receive the correct case ending. Other functions affected would be called to modify their own arguments if necessary. As the syntax, in effect, disambiguates semantics, and lexical conceptual

structures make this disambiguation more explicit, it is possible to take advantage of this in translation and other cross-linguistic pursuits.

Davis (1995) makes use of Jackendoff's ideas when he proposes mapping between HPSG's semantics and syntax in his thesis on multiple-inheritance lexical semantics. He incorporates Dowty's (1991) lexical entailments in Jackendoff's framework. For example, the attributes ACT and UND of CONTENT in Figure 4, corresponding to 'Peter' (actor) and 'beer' (undergoer), would express the following entailments:

ACT

- Volitional involvement in the event or state
- Perceives or has a notion of the other participants or events
- Causes an event or changes the state in another participant

UND

- Undergoes a state of change
- Incremental theme
- Causally affected by another participants

ACT and UND correspond to Dowty's Proto-agent and Proto-patient, respectively. Dowty's argument selection principle states that the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalised as the subject of the predicate, and the argument having the greatest number of Proto-Patient entailments will be lexicalised as the direct object. Davis detects difficulties in tying syntactic argument assignments directly to the number of entailments and introduces these proto-roles into lexical representations as a mediating level between semantic entailments and syntactic arguments to remedy the situation. Davis also organises all his proto-role (ACT, UND, FIG, GRND, EFFECT, MEANS, ACC-EV) relations influenced by Jackendoff's thematic layer into sort hierarchies with monotonous inheritance.

Davis's approach demonstrates that semantics can be interfaced with syntax in the HPSG framework with the help of conceptual structures similar to those advocated by Jackendoff and incorporating proto-roles advocated by Dowty and Wechsler (1991) with some modifications. However, the problem of how to integrate real-world knowledge and pragmatics is not dealt with to any depth in his thesis. Davis (1995:58), nevertheless, implies that entailments, when mapped from semantics to syntax, can be viewed as real-world knowledge, being implications about certain classes of actions in the world.

4. ONTOLOGICAL ENRICHMENT.

As we have seen, the constraint-based HPSG framework can be used to produce extremely rich lexical entries for extensive linguistic manipulation. Syntax, semantics and pragmatics can all be used to constrain the lexicon. Davis (1995) has shown how to use multiple linguistic hierarchies to connect the semantics of verbs through modified conceptual structures to syntax, and Verspoor (1997) has shown how to connect noun semantics to syntax and pragmatics with the help of qualia. Copestake's (1992) view of the necessity to isolate linguistic knowledge from the real-world (encyclopaedic) knowledge has been observed in both and for a good reason: although any two languages vary, the underlying real-world knowledge remains the same for

both languages no matter what words the speaker uses. Nevertheless, because real-world knowledge is often necessary to disambiguate the language, we need a mechanism to connect it somehow to lexical entries.

As noted in Section 2, in HSPG there is a rough correspondence between CATEGORY and syntactic structure, CONTENT and semantics, and CONTEXT and pragmatics, but there doesn't seem to be a similar component for real-world knowledge.

There are at least the following avenues one could use to introduce real-world knowledge systematically to HSPG framework:

1. Incorporate all lexical entries into a hierarchically organized, inheritance lexicon to form a super-ontology or a semantic net of ontologies.
2. Use the BACKGROUND attribute in CONTEXT to connect with real-world knowledge.
3. Use the conceptual attributes in CONTENT to connect with real-world knowledge.

Including real-world information in lexical entries themselves would enable the arrangement of lexical entries along the lines of hierarchies in real-world ontologies. However, as previously noted, it is better to keep the domain knowledge separate from linguistic knowledge in lexical entries. There are ontologies aiming at comprehensive coverage of common sense, real-world data, such as CYC (Lenat 1995), which may have potential if a comprehensive, common sense ontology connection to HSPG lexical entries is attempted.

There are also hundreds, even thousands, of real-world ontologies distributed around the net and created for specific domains with no ambitions to CYC-like common sense or semantic knowledge like that of WordNet (Miller et al 1990). For example, there are many RDF- and DAML-based ontologies available for the use in the context of the Semantic Web (<http://semanticweb.org>). The number of these ontologies is growing, and their development is undertaken in a distributed fashion. The results of this development could be taken advantage of by the HSPG framework.

If we follow the principle that real-world knowledge incorporated in HSPG lexical entries should be minimized, then we need some sort of interface or pointer system to connect real-world knowledge to linguistic knowledge. In practice, it is possible to include any relevant information in CONTEXT's BACKGROUND attribute. Another way to accomplish this might be to fine-grade either the nouns's qualia structure or the verbs' conceptual structures to such an extent that the distinction between linguistic and real-world knowledge is erased. However, this is undesirable as already pointed out.

Our proposal is to connect distributed, real-world ontologies to linguistic knowledge (syntactic-semantic-pragmatic) while keeping the two separate from each other. As explained in Section 2, the selectional restrictions imposed by the verb's ARG-S structure constrain the types of arguments that the head verb can accept. This is shown in Table 1.

A) Sentence:	'Peter' [3] drinks 'beer' [4]
B) Verb's Synsem's ARG-S:	< [3]NP:[1],[4]NP:[2] > (See Figure 4)
C) Lexical Conceptual Structure:	[Event CAUSE ([Thing]1, [Event GO ([Thing LIQUID]2, [Path TO ([Place IN ([Thing MOUTH OF ([Thing]1))]))])]]]

TABLE 1: VERB'S ARG-S RELATION TO THE PHRASE AND LEXICAL CONCEPTUAL STRUCTURES.

If Jackendoff's lexical primitives in the Action tier (Table 1: C) had a finer-graded internal structure, a semantic sort could be constructed. *Beer*, for example, could then be subsumed under Jackendoff's THING → PHYSICAL → SUBSTANCE → LIQUID in a semantic sort having the structure shown in Figure 5 (grossly simplified and lacking in detail).

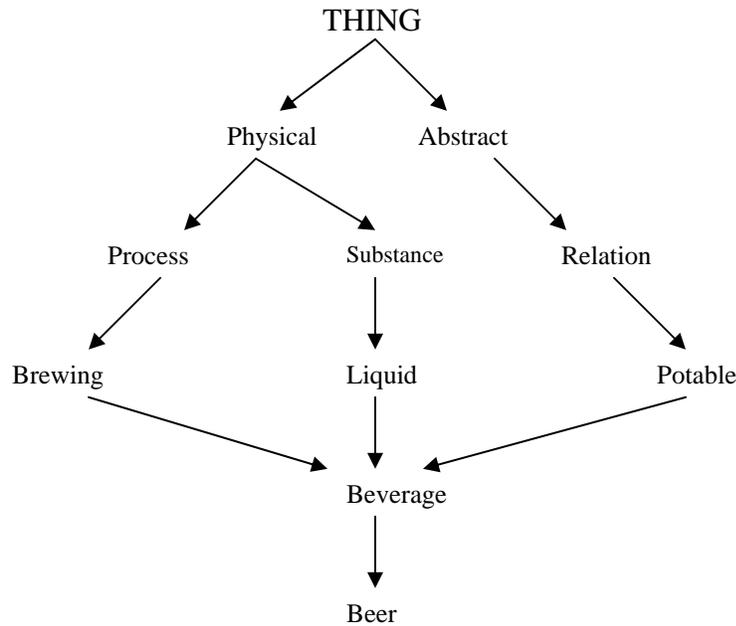


FIGURE 5: SIMPLIFIED, PARTIAL HPSG SEMANTIC SORT ONTOLOGY FOR NOUNS.

Selectional restrictions imposed by the verb's ARG-S (Table 1:B) could then help in determining whether a particular leaf in the semantic sort was acceptable. For example, *Peter drinks motorbikes* would not be an acceptable phrase because *motorbikes* is not a potable liquid.

HPSG's semantic sort forms an upper ontology, which, in our approach, is directly aligned with the suitable Semantic Web ontology (i.e., Foods or Drinks ontology of some sort in this particular case) with the help of Semantic Web Agents (Pease et al. 2002). In aligning the minimal noun ontology with the Semantic Web, similarity heuristics similar to those used in the MikroKosmos project to align MikroKosmos with WordNet can then be used (O'Hara et al. 1998).

Pollard and Sag’s (1994) footnote in their Appendix supports this view of interfacing linguistic and real-world knowledge:

Such knowledge should probably not regarded as strictly linguistic, but rather part of a distinct module of encyclopaedic knowledge with which linguistic knowledge interfaces. Likewise we do not declare here what features (‘semantic roles’) are appropriate for various subsorts of qfpsoa; but we assume that for each subsort of qfpsoa, the only sorts of values that are available for these features are either REF or PSOA.

In the present case, Index’s ref attribute could be used to refer to the index of the particular entity in the HPSG’s semantic sort, while the Background’s parameterised state of affairs (psoa) could refer to the Semantic Web ontology with which the partial HPSG’s semantic sort ontology would then need to be aligned. Figure 6 shows how *Beverage* is indexed to the HPSG semantic sort, and how the domain in the lexical entry points at the Semantic Web ontology with the ID of 412.

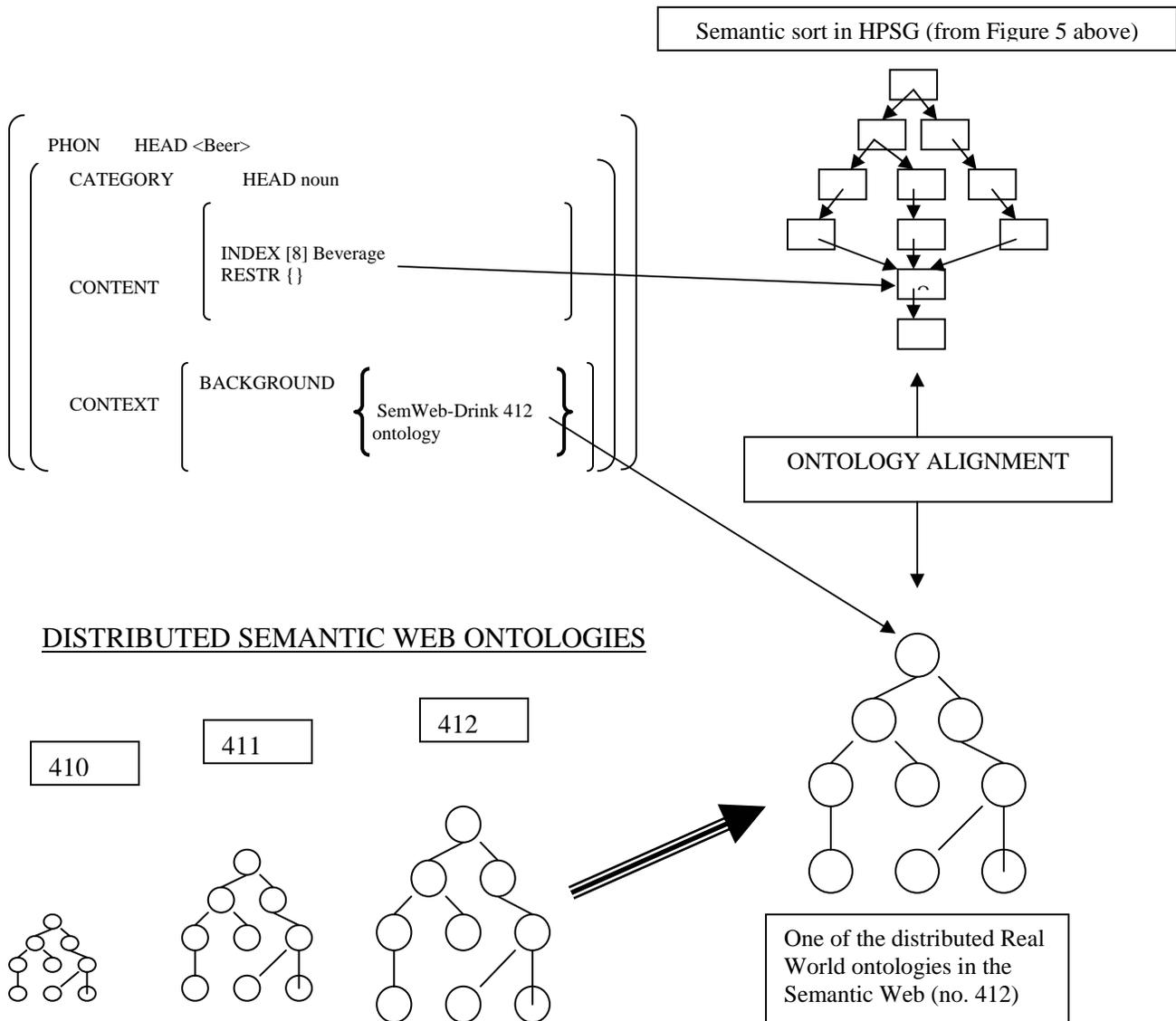


FIGURE 6: LEXICAL ENTRY FOR ‘*BEER*’ AND ITS RELATION TO THE HPSG SEMANTIC SORT ALIGNED WITH THE SEMANTIC WEB ONTOLOGY.

In this way, Jackendoff's LCS's could be used to constrain the lexicon semantically and to connect it to the distributed Semantic Web ontologies for further disambiguation, exploiting world knowledge coded there. This would form the interface between linguistic and real-world knowledge, the real-world knowledge residing partly in an HPSG-based lexicon but mostly in the distributed ontologies. A comparable division in MikroKosmos between its lexicon and ontology was found to be highly desirable (Nirenburg et al. 1996).

When aligning the partial semantic sort ontology with the appropriate distributed Semantic Web ontology, semantic agents and the Agent Semantic Communications Service (ASCS) can be used in the task (Pease et al. 2002). The idea is that each RDF-based semantic ontology in the Semantic Web exhibits its own structure in a way that is readily interpretable by the Semantic Web agents.

Another way to connect real-world knowledge to a lexicon, be it based on the HPSG or another type of grammar, would be to create a semantic/world knowledge interface along the lines suggested above, but, instead of directly aligning it with the Semantic Web ontology deemed most appropriate, align it with SUMO currently under development (Niles and Peace 2001). SUMO is designed to act as a go-between top ontology in the semantic web to unify its disparate ontologies. This would make it easier to design a compatible semantic sort ontology for the lexicon (in this case HSPG-based).

5. CONCLUSION.

Davis (1995) and Verspoor (1997), basing their research on theories of Jackendoff (1983, 1990), Pollard and Sag (1994), Pustejovsky (1995), and others have demonstrated the feasibility of constraining lexical entries with the help of lexical conceptual structures and semantic sorts to facilitate the integration of syntactical, practical, and semantic knowledge. However, although both Davis and Verspoor admit the need for real-world knowledge in linguistic processing, they have not tackled this issue head-on because it falls outside the scope of their respective studies. Androutsopoulos and Dale (2000) have made concrete suggestions on how to use selectional restrictions in HPSG to achieve this.

In this article we have indicated some avenues to follow in order to include real-world knowledge with the constraining elements of HPSG. Nirenburg et al. (1996) have pointed out the importance of including some of the real-world knowledge in the lexicon in addition of having a more extensive ontology added to it. Their MikroKosmos project in a stand-alone environment has inspired and guided us in the attempt to extend this idea to a distributed environment in the Semantic Web. XML-coded, RDF-based, and domain-specific ontologies that are accessible to all can be developed in an extendible fashion in the Semantic Web. One of the latest developments, SUMO, will allow the combination of distributed, domain-specific ontologies under the common top ontology. This, in turn, will facilitate the alignment of lexical ontologies (semantic sorts), be they based on HPSG or any other grammar.

The motivation for this article and our proposal was outlined in the introduction. HPSG could be used in the integration of real-world knowledge as an additional constraint into lexical entries. The resulting lexicon could then be used for disambiguation in order to improve the accuracy of current parsers. This, in turn, would lead to more reliable language learning and translation applications.

Although we have specified the requirements of HPSG and LCS here, at the same time we have tried to avoid getting too deep in their specific details: there are other grammars, conceptual frameworks, and techniques that could be used instead. The important point we have tried to raise is that the distributed ontologies in the Semantic Web can be used for the purpose of adding real-world knowledge to linguistic knowledge as a constraint for the purpose of disambiguation.

REFERENCES

- Abney, S. 1996. Part-Of-Speech Tagging and Partial Parsing, In: Church, K., Young, S., Bloothoof, G., 1996. *Methods in Language and Speech*. An ELSENET book, Dordrecht: Kluwer Academic Publishers. Available in: <<http://www.sfs.nphil.uni-tuebingen.de/~abney>>.
- Androutopoulos, I., Dale, R. 2000. Selectional Restrictions in HPSG. *Proceedings of the 18th International Conference on Computational Linguistics (COLING)*, Saarbrücken, Germany, 31 July – 4 August 2000, 15-20.
- Chomsky, N. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.
- Copetake, A. 1992. The Representation of Lexical Semantic Information. PhD Thesis. Sussex University. Cognitive Science Research Paper CSRP 280.
- Davis, A. 1995. Lexical Semantics and Linking in the Hierarchical Lexicon. PhD Thesis. Stanford University.
- Dorr, B.J. 1992. The Use of Lexical Semantics in Interlingual Machine Translation. *Journal of Machine Translation* 7 (3): 135-193.
- Dölling, J. 1995. Ontological domains, semantic sorts and systematic ambiguity. *International journal of human-computer studies* 43: 785-807.
- Dowty, D. 1991. Thematic Proto-Roles and Argument Selection. *Language* 67 (3): 547-619.
- Fensel, D., van Harmelen, F., Horrocks, I., McGuinness, D.L., Patel-Schneider, P. 2001. OIL: An Ontology Infrastructure for the Semantic Web, *IEEE Intelligent Systems*, March/April 2001: 38-45.
- Jackendoff, R. 1983. *Semantics and Cognition*. Cambridge, Mass.: The MIT Press.
- Jackendoff, R. 1990. *Semantic Structures*. Cambridge, Mass.: The MIT Press.
- Lenat, D.B. 1995. Cyc: A large-scale investment in knowledge infrastructure. *Communications of the ACM*, 38:33-38.
- Locke, C. 1990. Common Knowledge or Superior Ignorance? Robotics Institute. Carnegie Mellon University. A modified version of the paper that appeared in *IEEE Expert*, Dec., 1990. <<http://www.panix.com/~clocke/ieee.html>>.
- Miller, G., R. Beckwith, C. Fellbaum, D. Gross and K. Miller. 1990. Five Papers on WordNet. *CSL Report 43*. Cognitive Science Laboratory. Princeton University.
- O'Hara, T., Mahes, K., and Nirenburg, S. 1998. Lexical acquisition with WordNet and the Mikrokosmos ontology. In Sanda Harabagiu, editor. *COLING-ACL'98 Workshop on Usage of WordNet in Natural Language Processing Systems*. Université de Montréal, 94-101.
- Niles, I., & Pease, A. 2001. Toward a Standard Upper Ontology, in *Proceedings of the 2nd International Conference on Formal Ontology in Information Systems (FOIS-2001)*.

- Nirenburg, S., Beale, S., Mahesh, K., Onyshkevych, B., Raskin, V., Viegas, E., Wilks, Y., Zajack, R. 1996. *Lexicons in the MikroKosmos Project*, in *Proceedings of the AISB'96 Workshop on Multilinguality in the Lexicon, UK, April 1-2*.
- Pollard, C. and Sag, I.A. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: The University of Chicago Press.
- A. Pease, I. Niles, and J. Li. 2002. The Suggested Upper Merged Ontology: A Large Ontology for the Semantic Web and its Applications. Presented at *AAAI-2002 Workshop on Ontologies and the Semantic Web*. <<http://reliant.tekknowledge.com/AAAI-2002/Pease.doc>>.
- Pustejovsky, J. 1995. *The Generative Lexicon*. Cambridge, Mass.: The MIT Press.
- Tapanainen, P. and Voutilainen, A. 1994. Tagging accurately: don't guess if you don't know. Technical Report, Xerox Corporation.
- Verspoor, C.M. 1997. Contextually-Dependent Lexical Semantics, PhD Thesis. The University of Edingburgh.
- Wechsler, S. 1991. Argument Structure and Linking. PhD Thesis. Stanford University.
- Wiese, H. 2001. Modelling semantics as a linguistic interface system. Unpublished manuscript. <<http://www2.rz.huberlin.de/linguistik/institut/wiese/publications/index.htm>>