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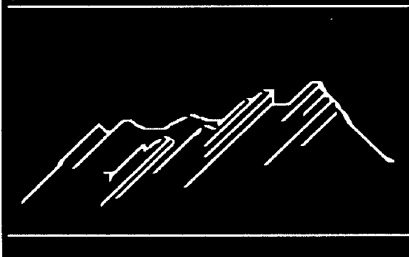
Technical Report

The Interaction of Preserved Pragmatics and Impaired Syntax in Japanese and English Aphasic Speech

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Abstract

Elicited narrative studies showed that the underlying pragmatic factor of empathy is
relatively preserved in aphasic speakers of Japanese and English (7 Japanese and 14
English-speaking aphasics of varied diagnostic types). Occasional 'reversal errors'
can be explained in terms of a conflict between the normal encoding of the empathic
characteristics of an event and the syntactic limitations imposed by impaired
production processes. To account for these findings, we propose a production model
following Levelt (1989) for making pragmatic choices among syntactic forms. We
also suggest that 'canonical form' might be a matter of surface morpho-syntax,
rather than involving semantics or more abstract levels of syntax.

The Interaction of Preserved Pragmatics and Impaired Syntax in Japanese and
English Aphasic Speech

Menn, Reilly, Hayashi, Kamio, Fujita and Sasanuma

Introduction

This paper presents evidence for preservation of pragmatic competence in
the face of impaired syntactic output by aphasic speakers of Japanese and English.
Expanding on the results of Menn, Kamio, Hayashi, Fujita, Sasanuma, and Boles
(1993), we show further that aphasic speakers' difficulties in finding ways to describe
particular pictured events can be explained in terms of a conflict between (a) a
preserved ability to appreciate the empathic characteristics of an event and (b) an
impaired mechanism for syntactic production. The precise nature of the syntactic
impairment is not important for this demonstration, although in the conclusion we
will propose a conceptual model for it that appears promising. In the course of this
investigation, we also have found evidence suggesting that the 'canonical form'
relied on by non-fluent (and many fluent) patients might be a matter of surface
morphology and syntax, rather than involving semantics or more abstract levels of
syntax, as the literature to date has assumed.

'Pragmatics' is taken by linguists to concern a whole spectrum of
considerations involved in actual language use. At what one might loosely term a
'macro' level (following Levelt 1989), this involves such abilities as appreciating
humor, observing politeness, and producing well-formed narrative structure, to
mention three areas which have been investigated in aphasia (e.g. Bihrle et al. 1986,
Brownell et al. 1983, Ulatowska et al. 1981, 1983). At a more 'micro' level,
pragmatics concerns choosing among alternative sentence structures that can
express essentially the same proposition (cf. Levelt, op.cit.), e.g., active, passive,
impersonal, and multiple-clause structures. In this paper, we present
experimentally elicited cross-linguistic evidence for two specific aspects of preserved
'micro' pragmatic competence in patients with left-hemisphere damage: (a)
'empathy' and (b) preserved awareness of the focus of an interlocutor's question.
These findings complement those of Bates & Wulfeck (1989) and Bates, Hamby, &
Zurif (1983), who showed that patients had appropriate reactions to another 'micro'
pragmatic dimension, that of new vs. old information.

In studying pragmatic competence in aphasic speakers, one must distinguish
patients' knowledge of pragmatic norms from their ability to find and/or use the
linguistic structures needed to conform to those norms. Indeed, it is a clinical
commonplace that severely impaired patients retain the pragmatic knowledge that a

WH-question like "What is she doing?" requires a different kind of answer from a yes-no question like "Is she singing?", but they lack the ability to supply that answer.

The concept of empathy is treated here as a psychological primitive, an attitude or state of mind towards a person (or other entity) which we can roughly describe as an attitude of 'identification with' a participant in an event. We here follow Kuno (1978, 1987), who introduced the notion of empathy to linguistics in terms of 'shared viewpoint'. More generally, in describing which participant's viewpoint is taken by a narrator in the description of a transitive event, Kuno envisioned three points (arrayed on a continuum): sharing the viewpoint of the agent, taking a neutral stance, and taking the viewpoint of the person affected by the action (the undergoer). The 'empathic focus' of an utterance is an entity, referred to in the utterance, whose viewpoint is shared by the speaker. With Kuno, we assume that this attitude of the speaker towards the participants in an event may or may not have an overt linguistic manifestation. So a particular utterance describing an event may not have an identifiable empathic focus, either because the narrator is neutral or because he/she does not choose a form which indicates viewpoint overtly.

As this affective/cognitive notion of empathy has been helpful in describing the response patterns of both aphasic and normal control subjects, we argue that it is an empirically testable and psychologically real construct. However, it is by no means adequately defined at present; much work remains to be done. In normal conversations as well as in our elicited materials, there is considerable confounding of empathy, animacy, and topicality; while we have tried to distinguish among them, most of the work of disentangling their (putatively) separate contributions to the choice among syntactic forms lies in the future.

I. Background

A. 'Empathy', speaker, and hearer in a cognitive model of sentence production.

In a cognitive model of sentence production (Garrett 1980, Levelt 1989, Brown & Dell 1987), the selection of a particular syntactic/lexical form for the expression of a proposition begins with pre-linguistic cognitive processes involving the speaker's evaluation of the addressee (degree of acquaintance, status, mental competence, likely attitudes...) and the setting of the discourse (home, street, classroom, courtroom, hospital...). The prelinguistic processes also include maintaining and updating some sort of representation of the knowledge that one believes one's conversation partner possesses. The speaker needs such a representation in order to know, for example, whether to use a pronoun or one of many possible full noun

phrases to refer to the persons and objects under discussion: in beginning a narrative about an event that affected your uncle, does the hearer know that 'George' is the name of your father's brother? Does the hearer know that George has been on your mind, or will you have to start by mentioning that George has had serious problems lately? Have you referred to other males since your last mention of George, or will 'he' be sufficient to identify Uncle George at the moment?

This group of discourse factors is *hearer-oriented*; that is, they concern how the speaker takes the hearer's needs and expectations into account. But even if the normal speaker maintains a perfect model of the hearer's mental state - which in itself seems unlikely - that model is not always utilized properly (Karmiloff-Smith 1979), for various reasons. In particular, cognitive (pre-linguistic) choices for language processing need to include *speaker-oriented* factors: that is, factors which reflect the speaker's impulses and his/her other considerations. These may interact with the speaker's evaluation of the hearer and the setting. Our research to date has shown that an entity's emotional attractiveness (presumabed to elicit an empathic reaction), its motion or other evident power to cause an event, and its novelty/unexpectedness, are all speaker-oriented factors which affect the way in which an event is described by both aphasic and normal speakers (Menn et al. 1991; 1993, in press). In our data for Japanese as well as English, these factors tend to result in early explicit mention of the attention-getting entity.

Extensive cross-linguistic experimental work on normal subjects by Sridhar (1989) supports these findings. His study showed (p. 223) that "Entities rendered salient by virtue of their intrinsic meaningfulness (e.g. humanness), or perceptual focus, tend to be expressed sentence-initially, at or near the beginning of the sentence in SVO [subject-verb-object] languages..." Note that in the basic word order of the vast majority of languages of the world, the grammatical subject comes before the grammatical object in a sentence (Greenberg 1966). Furthermore, for most action verbs in most languages, the grammatical subject of the active-voice verb is the agent of the action ('Susan kissed Bill'). Therefore, the agent of an active-voice verb comes early in a sentence in the majority of the world's languages. In other words, the basic syntactic patterns of the world's languages put the agent of an active sentence just where the speaker's impulse would put it if it were the empathic focus.

We note here, however, that most languages also have verbs in which the grammatical subject of the active voice is not the agent ('Susan got a prize', The

door closed'); these 'undergoer-subject' verbs will become important to our discussion later.

In English, both the 'be'-passive and 'get'-passive make the undergoer the subject, so the passive voice almost always brings the undergoer towards the beginning of the sentence. This may serve a number of purposes: in particular, Kuno's analysis claims that 'Uncle George got hit by a car' reflects more empathy with the uncle than 'A car hit Uncle George' (Kuno 1978, 1987). Thus, Sridhar's explanation of preferred word order in terms of 'salience' agrees with Kuno's claim that when the speaker's empathic focus is a person affected by an action, the passive voice is more likely to be used to describe the state of affairs. More precisely, the passive sentence is a grammatical device which has, as one of its functions, the function of indicating empathy with the undergoer. (It also has related functions, such as deflecting attention from the agent, which are less relevant to the present paper - see Givon 1981, Shibatani 1985.) We will refer to passive and other constructions that bring the undergoer to the front of a sentence as 'undergoer-focusing' forms.[1]

Caveat: this psychological explanation of the function of passive in terms of word order is only partially adequate across languages, because in Japanese (and many other languages), there is no need to mention the subject (or the object) of a clause if it can be understood from the context. As in English, entities which have just appeared on the scene are normally referred to by noun phrases in Japanese, but Japanese omits nouns in approximately the same situations where English replaces them by pronouns. Therefore, omission (zero-pronominalization) in Japanese is approximately the functional equivalent of pronominalization in English. In a language with flexible word order, there is no way to define where a non-existent (zero) pronoun 'is' in a clause, so 'order-of-mention' explanations do not apply directly to sentences in such languages when they use zero-pronouns to refer to the participants.

B. Ways to encode a focused undergoer.

Research on aphasic syntax in both comprehension and production has focused very heavily on the use of active vs. passive voice. However, the elicited narrative data use many other expressive possibilities besides verb voice; we would say for aphasic speech what Slobin (1990) says with respect to child language: "It is impossible to understand the development of passive constructions in any one language, or to compare development across languages, without taking into account

the position of passive as one of a set of alternative constructions in each language under study." One way of indicating empathy with an undergoer which is not envisioned by the simple active/passive dichotomy is to encode an event in two clauses instead of one, making the undergoer the subject of a descriptive clause and then describing the event that occurred. For example, one might say: 'Uncle George was standing on the curb and a car hit him', rather than 'Uncle George got hit by a car'. In our data we found many aphasic and normal utterances of this two-clause type, e.g. 'He is drowning; dog save him.'

For some events, there is also a way to make the undergoer the subject of the clause that describes the event without using the passive. In English, a number of verbs occur with both transitive and intransitive meaning - for example:

blow.
(transitive)   The wind blows the hat off.
(intransitive)   The hat blows off.
(passive)   The hat gets blown off by the wind.
begin
(transitive)   The orchestra began the waltz.
(intransitive)   The waltz began.
(passive)   The waltz was begun by the orchestra.

In Japanese, there are many pairs of (historically) morphologically related verbs where one member of the pair is intransive and the other transitive; the transitive member of the pair may also form a passive using the affix (r)are. The intransitive member of the pair often has no English counterpart.

Table 1: Japanese verb forms

	<u>transitive active</u>	<u>intransitive</u>	<u>passive of transitive</u>
'save'	tasukeru	tasukaru	tasukerareru
	save	survive, remain alive	be/get saved
'find'	mitsukeru	mitsukaru	mitsukerareru
	find	?appear (after search)	be/get found
		- involuntary;	
		exist	
'hit'	ateru	ataru	aterareru
	hit	be/get hit	be/get hit
'shoot'	utsu	[no intransitive]	utareru
	shoot		be/get shot

A difference between the English and the Japanese undergoer-subject intransitives is that some Japanese intransitives can have an explicit agent, whereas English intransitives cannot. However, the agent's actions are construed as involuntary; this is not semantically very different from the restrictions on the English construction, e.g. 'The hat blew off in the wind' (*by the wind), or 'The vision appeared to the traveler' (*by the traveler).

Thus, if a semantically appropriate intransitive form is available, using it permits the undergoer to be the subject of the clause while still keeping simple active voice syntax. These constructions turned out to be very prominent in our data, owing partly to the particular events in our stimulus pictures.

Such forms are compatible either with a focus on the undergoer-subject or with a neutral viewpoint that simply describes the event, i.e. de-focusing the agent, but not focusing on the undergoer. Many other languages have similar possibilities. However, as the above list shows for Japanese vs. English, the particular verbs which happen to have undergoer-subject intransitives differ from language to language.

Finally, there are lexical as well as morphological and other more extended ways to indicate empathy, such as describing a person's mental state interpretively ('She is really upset') or describing motion using words that imply sharing his/her

physical point of view ('The ball comes and hits him'). Such descriptions contrast with more objective descriptions of the same pictured states of affairs ('She is making a face', 'The ball hits him'). Lexical indications of viewpoint are evident in both normal and aphasic narratives.

II. Experimental Studies

We carried out three studies to test the hypothesis that aphasics and normals are alike in preferring to begin sentences by mentioning or referring to the empathic focus first. We further hypothesized that the agency and animacy effects found in agrammatic aphasics by Saffran et al. (1980) are consequences of this preference. We suggest, finally, that the subject/object reversal errors that they found were consequences of the interaction of this empathic preference with the patients' severe limitations in syntactic output.

To test the claim that empathy, rather than animacy, is the key factor in the choice of which participant to begin a narrative with, speakers must be induced to talk about events in which (1) a plausible empathic focus is not an agent; and (2) the agent and the undergoer are both animate or both inanimate, so that animacy becomes irrelevant to the order in which they are mentioned.

A. Study 1: Elicited Narratives

Hypothesis: Aphasic patients resemble normal speakers in their tendency to begin sentences by referring to the empathic focus/protagonist of a narrative. This, rather than an animacy hierarchy *per se*, determines the choice of the subject; earlier results supporting an animacy effect are due to the much greater likelihood that an animate entity (as opposed to an inanimate one) will arouse empathy in the narrator's mind.

Method:

Subjects. The aphasic subjects were unselected for diagnostic type: we collected data from nine English-speaking patients capable of giving narratives (two moderate Broca's, one moderate mixed non-fluent, one anomic, and three mild fluent aphasics) and nine Japanese patients (moderate Broca's, mixed non-fluent, and a mild Wernicke's aphasic). All were right-handed and had suffered a single left-hemisphere CVA. Responses were also obtained from ten healthy English-speaking controls aged 50 to 80, and four healthy middle-aged Japanese controls. Not all the Japanese subjects narrated all the stories; the number of narrators for each Japanese story varies from 3 to 7 aphasics, and from 2 to 4 controls.

Stimulus Materials. Five 3- or 4-frame narrative cartoon strips were used, resulting in a total of nineteen frames (Figs. 1a-e). The four possible basic patterns of interactions between animates and inanimates were all illustrated (animates acting on inanimates, inanimates acting on animates, two animates interacting, two inanimates interacting), plus several agentive and non-agentive intransitive actions.[2] The stories also varied other factors, such as how many humans were involved, whether there was a single clearly-defined protagonist who could be presumed to be the empathic focus of the story, how 'volitional' the protagonist was, and whether the protagonist or another person was the agent in Animate-Animate (A-A) interactions.

INSERT FIG.1 ABOUT HERE　(pp. 45 - 47)

1a: Ball　　　1b: Race　　　1c: Apple　　　1d: Boat　　　1e: Hat

Elicitation Method. English and Japanese aphasic patients and controls were presented with these pictures, and asked to tell the stories; they were prompted and aided as little as possible. Their transcribed narratives were analyzed for error patterns and sentence forms chosen or attempted. Sample English and Japanese narratives are given in Appendix A; more examples may be found in Menn et al. 1993b.

Event analysis. In order to compare responses across subjects, the cartoon stories were analyzed as a series of events, reflecting subjects' typical responses (Table 2, Event Analysis). For example, both normals and aphasics, in describing Frame 1 of Apple (Fig. 1c), interpret the boy's posture in the context of the whole story. Normals gave responses like "The boy is trying to get an apple but he can't reach it"; a moderate agrammatic aphasic said "The boy like to have apple - but apple is too high." No respondent gave an uninterpreted description, such as 'The boy is standing on tiptoe under an apple tree with his arm held up in the air'.

Table 2: Event analysis

Story/Panel	agent/cause	1st entity affected*	2nd entity affected	action
Ball 1	boy	soccer ball		kick
Ball 2	boy	soccer ball	window	go through, break
Ball 3a	ball	lamp		hit
Ball 3b	ball	lamp		fall˙

Ball 3c	ball			land
Ball 3d	all above	man		arouse mental state
Ball 3e	man	man		move, look at
Ball 3f	man	ball		step on
Ball 4a	man			look out
Ball 4b	man			be in mental state
Ball 4c	boy			be in mental state
Race 1	girl	shoelace	shoe	tie shoelace
Race 2	other person	number	girl	place number
Race 3	girl	? other racers		run, pass
Race 4a	girl	? race		win
Race 4b	other person	prize cup	girl	transfer
Apple 1	boy	apple		get
Apple 2	boy	broom		pick up
Apple 3	boy	broom	branch	hit
Apple 4a		apple		fall
Apple 4b	apple	boy's head	boy	hit
Apple 4c	boy			be in mental state
Boat 1a	boat	boat		move
Boat 1b		man		sleep
Boat 1c	man	fish		catch
Boat 2	boat	dock		collide
Boat 3a	boat	man		fall
Boat 3b	man			be in mental state
Hat 1	man	man		walk
Hat 2	wind	hat	man	remove hat
Hat 3/a	wind	hat	man	roll
Hat 3/b	man	hat		catch
Hat 4	man	hat	cane	pick up

The propositions were divided into 'foreground' propositions, which carried the main story line, and 'background' propositions. For the present study, only 'foreground' propositions were analyzed.

The column headers of Table 2 give the semantic relations of the people and objects mentioned or referred to, as indicated by the verbs used and by the word order (for English) or the case particles (for Japanese). This includes entities which were referred to by pronouns or zero-pronouns. The descriptive labels for the semantic relations (agent/cause, 1st entity affected, 2nd entity affected) were chosen to be independent of the particular syntactic form that a speaker might have used. Columns 1-3 show which person(s) and/or objects in the frame were mentioned or referred to. Some arbitrariness is unavoidable in all of these decisions; the 'event analysis' is intended only as a framework for study of the narrative contents of subjects' responses.

Response analysis. Every clause or phrase produced in response to each frame was coded for the propositions it contained, and for the entities referred to. Grammatically correct zero-pronouns, as discussed above, are common in all the Japanese narratives, for example:

Mr. Hamaguri, non-fluent

Tsue o	*tsukat-te*	*joozu-ni*	*hippariage-ta.*
cane PART:OBJ	use:PRED-CONJ	skilfully:ADV	pull up:PRED-PERF

using cane - skilfully - Ø - pulled [it] up

Zero-pronouns are also found, grammatically, in conjoined sentences of English-speaking normals, and ungrammatically, in the narratives of more severe English-speaking aphasics. Their grammatical function is indicated by the position of "Ø" in the following examples:

Mr. 'Badger', normal control:
Race 3/4: She runs the race and Ø wins first prize.

Mr. 'Zebra', moderate Broca's aphasic:
 Hat 4: cane...then Ø pull Ø out water
(paraphrase: He takes the cane, then he pulls the hat out of the water.)

The number of descriptors that the subjects gave for each frame reflects the complexity of the event pictured: Frame 1 of Ball (Fig. 2a), for example, was always described with the boy as grammatical subject of an active verb (either the concrete verb 'kick', the more general verb 'play with', or the more interpretive 'play soccer'), but Frame 3 of Ball was described by following the ball's trajectory, what happens to the lamp, the man's reactions, or various combination of these.

Viewpoint analysis: marked and unmarked. Utterances were divided into two classes: those where there is some overt indication of the viewpoint of the speaker (marked empathic focus), and those in which the speaker might either be neutral or be taking the viewpoint of the grammatical subject of the sentence (unmarked empathic focus). The following pragmatic, semantic, and syntactic phenomena were taken as markers of empathic focus: explicit attribution of mental state, including effort or intention (the boy is happy, the man is scolding, the boy is trying, the man is looking to see who did it); evaluation of good or bad fortune (unluckily, the man had an accident); judgement of quality of performance (carefully, skillfully); topicalization; passivization; use of deictic verbs (the ball

comes in); and direct discourse (Hey! Sorry!). Semantically ill-formed transitive sentences in which the undergoer is the grammatical subject ('He hits on the head - it - the apple') were also taken to indicate empathy with the undergoer (which the aphasic speaker was unable to encode correctly).

Findings: Propositions encoded. The choice of which propositions to encode appeared very similar across members of all four subject groups. However, there may be some language- or culture-based differences between Japanese and English speakers. The number of Japanese subject responses was too small for separate statistical analysis, so the remainder of this section will deal only with English or combined data.

Figure 2 shows the total number of propositions devoted to each 'event' by English-speaking normals and aphasics; the correlation between the normal and aphasic encoding choices is 0.871. Thus we find very similar abilities with respect to deciding 'what is worth talking about' in English-speaking aphasics and normals. This in turn makes it possible to compare the way that the aphasic speakers and the control subjects chose to use marked forms and to assign syntactic roles to entities in the stories.

Insert Fig.2 about here (p. 4 8)

Use of marked forms. Japanese and English data were combined for this analysis. The correlation between the normals' and aphasics' choice of marked (as opposed to unmarked) forms for a given proposition was also very high, 0.80. However, there were differences in the marking devices that they chose to use. For example, many of the more impaired patients in both languages marked their viewpoint by the use of direct discourse:

Ms. Tampopo,	non-fluent	Ball 4		
Ntoo	*nto*	*ne*	*"gomen*	*ne."*
well:INTERJ	well:INTERJ	PART:SFL	"sorry	PART:SFL"

However, none of the normals in Study 1 did so.

Factors in the choice of subject/topic and verb voice. We then compared patients' and controls' choices of the assignment of the roles of grammatical subject (and in Japanese, grammatical topic) to the participants in the stories. For English

speakers, word order was taken to indicate the grammatical roles played by the referents; for Japanese speakers, we relied almost entirely on the case markings (ga = subject marker, wa = topic marker). When a zero-pronoun was unambiguously the subject, it was counted as such. Figure 3 shows this set of choices for normals versus aphasics for the 'Hat' story, again combining the results from English and Japanese. Note the switches back and forth among 'man', 'hat', and 'wind'. Similar switches were noted between the girl and the other people in the 'Race' story; among the boy, the ball, and the man in 'Ball', and so on. Overall, a clear similarity was found between the aphasics and the normals in their choices of which entity to encode as the subject/topic in each frame (Menn et al. in press).

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     Insert Fig. 3 about here   (p. 49)

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Three factors accounted for grammatical subject/topic choice across the four subject groups: Animacy, Motion/Causal Efficacy, and Affectedness. Animates were chosen as subjects/topics in 71% of clauses (403 animate vs. 164 inanimate subjects/topics). When an Inanimate was chosen as subject/topic of a particular scene, it was most likely to be a cause (wind 16, ball 19, boat 18, impact of boat 6, apple 13 instances, out of the 164 inanimate subject/topics) and/or a freely moving object (ball 43.5, lamp 1, hat 27.5, boat 20, apple 37 out of 164). (Some objects figure in both of these categories in some panels. Ambigous referring expressions were counted as .5 for each possible referent.) Six inanimate items coded as subjects/topics were found in existential sentences, such as "There's a broom leaning against the tree": these items appear to be introduced because they are about to play roles in the story (water 1, broom 5). The remaining inanimate subjects/topics are objects heavily affected by the action, namely, the broken window (5) and the falling lamp (1).

Markedness and animacy. For both aphasic and normal English speaking narrators, marked subjects are much more likely to be animate than inanimate (see Table 3). While 34% (158/463) of the subjects/topics of the unmarked clauses are inanimate, only 6% (6/104) of the subjects/topics of the marked clauses are inanimate (3.5 references to the ball and 1 to the apple, which are freely moving causes; .5 to the hat, a moving undergoer; and 1 to the broken window glass), chi-squared $(1, n=567) = 33.26$, $p<.005$.

Table 3 : Markedness and animacy

	Marked clauses (N)		Unmarked clauses (N)		
	Animate	Inanimate	Animate	Inanimate	Total
Aphasics	53	3	144	71	271
Normals	45	3	161	87	296
Totals	98	6	305	158	567

Animacy and reversal. No completed subject-object reversal errors were found in Japanese or English in the five stories of Study 1. None, of course, were expected in the nine frames in which 'animacy strategy' could work - i.e., those in which the event can be construed as an Animate acting on (or attempting to act on) an Inanimate object. But there were also no reversals on any of the other frames, where an animacy strategy could not apply, or could not fully determine the order of the people and things mentioned.

Detailed analysis of these data requires some preliminary discussion. In the attempt to create realistic and mildly interesting stories, we used events of a little complexity. A review of Table 2 (Event analysis) shows that these events cannot simply be classified as 'Transitive:Animate-Inanimate", "Intransitive-Animate", or the like. Such classifications will work for the clauses used to encode the events, but not for the events themselves, which may often be encoded in several different ways. Consider, for example, the three frames which may be considered 'Animate-Animate' (Race 2, 3, 4), in that they each contain two people. Race 3 is Transitive:Animate-Animate if it is described as a transitive scene (one girl races against/passes the other), but Intransitive (and therefore not relevant to the reversal issue) if it is just described as 'The girls are racing' or the like.

The other two frames involve three entities, since they show the transfer of an object from one person to another. They are usable for the reversal analysis, since animacy could help with encoding the object, but not the people. The people were clearly not reversed; furthermore, as the recipient of the object was the protagonist, many normals and aphasics (including Broca's aphasics) in both languages successfully used active-voice 'receive/accept' verbs (e.g. Race 4 'She gets a prize'). In other instances, both control and aphasic subjects used the secondary character as the sentence subject (e.g. Race 2, 'Somebody gave her a number').

The absence of reversal errors, however, does not mean the absence of problems in encoding argument structure. Two of the frames that may be encoded

as Inanimate-Inanimate posed problems for some of the Japanese aphasics who tried to begin with the object affected (the window in Ball Frame 2, the hat in Hat Frame 2; the latter is of course also encoded as a three-term Inanimate-Inanimate-Animate event, the wind affecting the hat and the man). English speakers had fewer problems with these frames, but this may be a finding specific to the particular events or their sequence. In the case of the window in Ball Frame 2, most English-speaking patients, like the normals, followed the moving ball's trajectory through the window (Mrs. 'Kalmia', Broca, "the boy - kick a - throw - no - duh no, kicked the ball - kits [kicks] the soccer ball through the window"; Mr. 'Hyrax', anomic, "an' he puts it through the plate window"), rather than encoding 'ball breaks window' as an independent event.

Problems were more evident for some patients in the events typically encoded as Inanimate-Animate: Apple, Frame 4, Apple hits boy; Ball, Frame 3a, Ball surprises man; Boat, Frame 3, Boat impact causes man to fall overboard. As indicated above, a few of these sentences had semantically incompatible subject and verb, e.g. fluent Mr. 'Wallaby', "He hits on the head" for Apple, Frame 4, Fig. 2a. These errors appear to result from blends of two sentence structures; here, the patient starts with the boy as subject, but continues with a predicate that follows the trajectory of the apple. (This error could be seen as substitution of active 'hits' for get-passive 'gets hit', but this seems implausible, since Mr. Wallaby was a rather mildly impaired patient who had few functor problems: for example, he began this narrative by saying "Here he is trying to reach the apple, if it's an apple.")

Passive voice. For historical reasons, much linguistic discussion of empathy has centered around the choice of active vs. passive voice, in spite of the limited role actually played by passives (especially be-passives) in ordinary speech (cf. Slobin's remarks cited earlier). One fluent and one non-fluent English-speaking patient and five normals used get-passives in Race 2; two fluent patients and the same non-fluent patient (Mr. Ferret) used variants of 'is thrown out' in Boat 3. However, in the Japanese data, neither patients nor normals made much use of passive voice (one for patients, five for normals) or OSV order (one instance for each group), so few conclusions of interest can be drawn about voice from this study.

B. Study 2: Controlled variation of undergoer (Brick and Snowball series)

Hypotheses. In this study, we attempted to manipulate a single variable: the empathic interest aroused by the undergoer. We created two series of pictures with no visible agent. The only variable within each series was the presumed empathic

appeal of the undergoer (operationalized by making the undergoer more valuable to a visible person and/or more like a person).

_____

INSERT FIGURES 4a 'BRICK SERIES' and 4b 'SNOWBALL SERIES' about here (p. 50)

_____

We hypothesized that as the empathic appeal of the undergoer increased, both normal and aphasic speakers would use more passives or other constructions which bring the undergoer to the front of the sentence. Further, we hypothesized that, as in Study 1, aphasics would be essentially the same as normals in their empathic responses, so that they would attempt to mark the undergoer in the same situations as normals, although they might have to use different means of doing so.

    Subjects. The English-speaking subjects of Study 2 included most of the English-speaking subjects of Study 1; all patients were unilaterally left-hemisphere damaged, and right-handed. Fourteen aphasic patients were able to give card-arrangement responses, and ten controls were used; there were also fourteen aphasic subjects who were able to give narrative responses, with nine controls. The fourteen oral aphasic responses came from 5 Broca's (severity: 3 mod =BDAE 2.5, 1 sev =2, 1 sev =1.5), 1 mixed non-fluent (1 mod =BDAE 3), 2 Wernicke's (1 mod =3, 1 mild =4); 6 anomic (1 sev =1.5, 2 mod =3, 2 mod =3.5, 1 mild =4). The card responses differed only in that one mild Wernicke's patient replaced one severe Broca's patient. Further patient data are tabulated in Appendix B.

    The Japanese subjects of Study 2 who provided oral responses were six aphasics and one normal. Four aphasics participated in both Study 1 and Study 2. Card data were limited to two aphasics who were among the six providing oral responses, so these data were insufficient for further analysis. The six oral aphasic responses came from 1 moderate Broca's patient, 3 moderate mixed non-fluents, 1 mild Wernicke's, and 1 mild anomic patient.

    Elicitation Materials. One series of graded undergoer-animacy pictures ("Brick series", Figure 4a) showed a brick falling off the scaffolding at a construction site and landing on, respectively, an unoccupied truck, a wagon pulled by a little boy, a teddy bear riding in the wagon that the boy is pulling, and the shoulder of a woman passing by. The second series ("Snowball series", Figure 4b) showed a snowball flying into the pictured scene and landing on, respectively, a sled being pulled by a child in a snowsuit, a bag of groceries sitting on the sled, a teddy bear riding on the sled, and another child riding on it. Each picture represented a single event, rather than being part of a sequence as in Study 1, and was introduced

separately; order of presentation was pseudorandom, and the pictures from this study were interspersed with the stimuli for Study 3, condition 1.

Each pictured event was introduced, while the patient was looking at it, with a sentence or two that supplied the needed lexical items, e.g. 'Here's a truck parked near some construction, right? A brick falls off.' The patient was then asked the neutral question 'What happens?' In Japanese, the subjects were asked the neutral question 'Please explain (this)' ('Setsumei shite kudasai').

Two response modes were used: oral responses and arrangement of cards with relevant words printed on them (e.g. for English, THE BRICK / THE LADY / HITS / GETS HIT/ BY). The cards permitted either an active-voice or get-passive response; the subject was told that there were several possible correct responses, and that in any case, some words would be superfluous. The data from the card arrangement responses were scored in terms of whether the undergoer or the moving object was put first, even if the patient failed to choose the passive verb or to use the BY card. The position and the choice of the verb form were thus disregarded, given the indications that functor morphemes were not being processed by some of the patients (e.g. being omitted while reading the cards aloud). (Normals, in fact, all correctly chose passive verb forms when they used the undergoer as the subject.)

Results

English: Card-Arrangement. The subjects tended to begin their response with the more human or human-related undergoers (THE LADY/ GETS HIT), often omitting the cause, while for the less human-connected inanimate undergoers (THE TRUCK, THE WAGON, THE SLED, THE BAG), they preferred to start with the cause (e.g. the brick). The more 'appealing' undergoer noun phrases (THE CHILD, THE LADY, THE TEDDY) were thus placed in initial position more often than the 'less animate' noun phrases (see Figure 5).

Figure 5. Study 2 English Card Responses, Brick and Snowball series combined. Mean frequency (out of four opportunities) with which aphasics and normals fronted the undergoer, according to level of presumed empathic appeal:

Level of Presumed Empathic Appeal
1=sled/truck, 4=child/lady
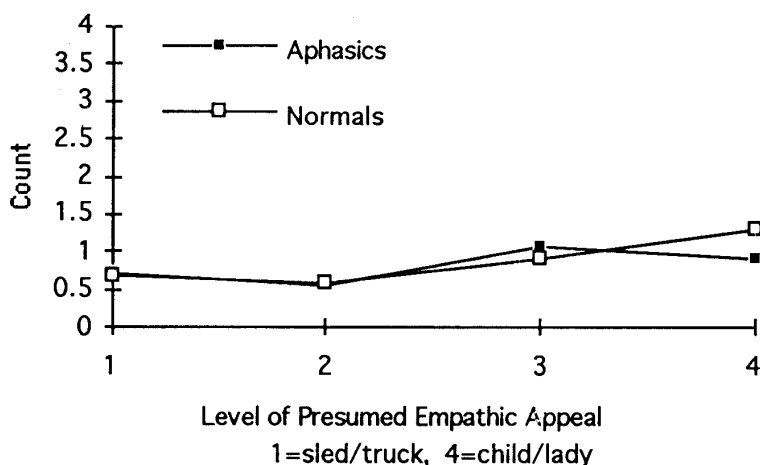
Analyses of variance showed that this linear trend was significant for normals [F(1) = 7.80, p = .0210] and approached significance for the aphasics [F(1) = 4.43; p = .0554]. The linear trend was not significantly different between the aphasic patients and the control subjects. Thus these results support the initial hypothesis. The finding that both the aphasic patients and the controls showed the same pattern suggest that aphasics, as a group, are similar to normals in the way that this discourse/semantic factor affects their preference for beginning with the undergoer.

Some of the card responses from one or two of the most impaired subjects involved reversals (THE LADY/HITS/THE BRICK). These appeared to be near-random (possibly due to reading deficits), rather than systematic. It would be difficult to ascribe them to a central loss of the ability to compute arguments, since parallel reversal errors were not found in oral production.

Oral Responses. For both languages, the greater freedom of the oral response mode allowed both normal and aphasic speakers to use mental state, direct discourse, and other explicit lexical markings of empathic focus along with or instead of passive or other means of undergoer fronting. Empathic marking was coded in the following categories: Undergoer Fronting, Passive/get-passive, Mental State, Direct Discourse, Deixis, Get-active, and Luck (expressions evaluating the good or bad fortune of the undergoer). Word order (Undergoer Fronting) and verb form

(Passive/<u>Get</u>-passive) needed to be coded as separate items, to allow for instances in which the subject was omitted ("Get hurt!") - and, more importantly, for instances of active voice in which the undergoer was the first referent mentioned. These included multiple clause constructions, intransitive undergoer-subject constructions, and simple listings of referents beginning with the undergoer.
<u>Examples:</u>

Mrs. 'Kalmia', (moderate Broca's; teddy bear picture, Brick series):
         markings: mental state and undergoer fronting
The bear, the bear - is [dIdi] - dizzy, uh, dizzy; the [bIts] (brick) fall down an' bear gets dizzy.

Ms. 'Daffodil' (recovered Broca's; teddy bear picture, Snowball series)
         marking: passive voice, undergoer fronting
the uh - ai - teddy bear is hit by a snowball

                   (lady picture, Brick series):
         marking: undergoer fronting, direct discourse
she is... ai ...grabs her uh - right arm - and says 'owiee'

The distribution of overt empathic focus markings showed an empathy gradient for aphasics and normals alike (see Figure 6). Counting each token of empathic marking that appeared, English-speaking normal subjects used no empathic markings on the pair of pictures intended to be the 'least empathic' (truck, empty sled undergoers) and an average total of 3.22 markings on the two pictures designed to be the 'most empathic' (human undergoers). English-speaking aphasic subjects used an average of .57 empathic markings on the two 'least empathic' pictures and 1.64 markings on the two with human undergoers. Both subject groups showed highly significant linear trends (normals, $F(1) = 58.26$, $p = .0001$; aphasics, $F(1) = 19.65$, $p = .0007$).

Figure 6. Study 2, English Oral Responses. Mean total number of empathic markers (no ceiling) used by aphasics and normals for the undergoer, at each level of presumed empathic appeal.

Level of Presumed Empathic Appeal
1=sled/truck, 4=child/lady
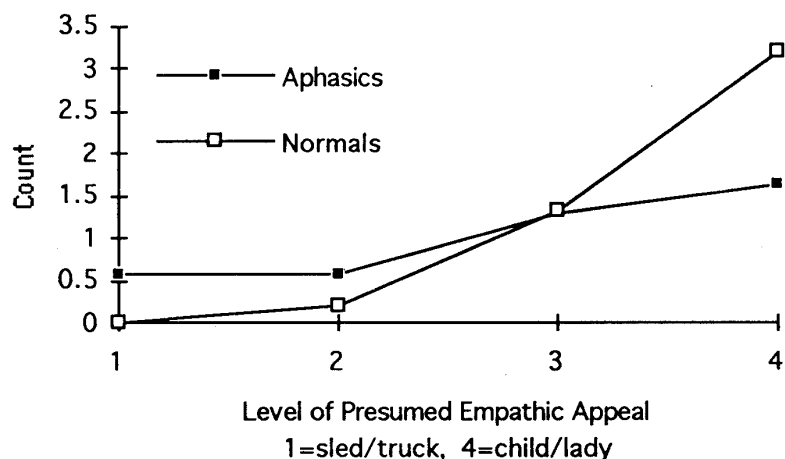
When individual types of empathic marking were examined, normals showed the same linear trend for use of Undergoer Fronting (F(1) = 40.36, p = .0002) and for Passive/get-passive (F(1) = 7.48, p = .0257). Aphasic subjects failed to show a significant empathy gradient in the use of these syntactic devices (for Undergoer Fronting (F(1) = 2.10, p = .1711 n.s.); for Passive/get-passive (F(1) = 1.80, p = .2025 n.s.)). Instead, their use of non-syntactic markers - deixis, mental state, direct discourse, and 'expressive locative' ('right in the face') - responded to the empathy gradient.

Examination of individual responses shows that a substantial subset (6 out of 14) of the aphasics' uses of passive were contributed by a single fairly well recovered non-fluent aphasic, Ms. 'Daffodil'; indeed, there appears to be a strong element of perseveration across her responses. The eight normal instances of passive voice were much more evenly distributed across the 72 responses to the eight pictured events, but one normal also showed considerable syntactic rigidity in her responses.

Japanese (oral responses only): Japanese card responses were obtained from only two subjects, as mentioned above, and so are not further analyzed here. The coding of empathic marking in Japanese oral responses is based on the orthographic transcriptions of data from the 7 subjects (1 normal, 6 aphasics).

There are two ways in which the counting of undergoer fronting differs between English and Japanese, due to the use of zero-pronouns in Japanese: (1) When the verb was intransitive and the undergoer was clearly its zero-pronoun subject, the undergoer was counted as 'fronted' even though it was not expressed. (2) Conversely (and conservatively), when the verb was transitive and the undergoer was its object, the undergoer was not counted as 'fronted' (as the zero subject pronoun might be thought of as coming 'first'). Other zero-pronoun cases were treated as indeterminate.

An empathy gradient is apparent in the responses from both the aphasics and the normal subject (see Figure 7).

Figure 7. Study 2 Japanese Oral Responses, Brick and Snowball series combined. Percent of instances in which subject used empathic markers for undergoer.
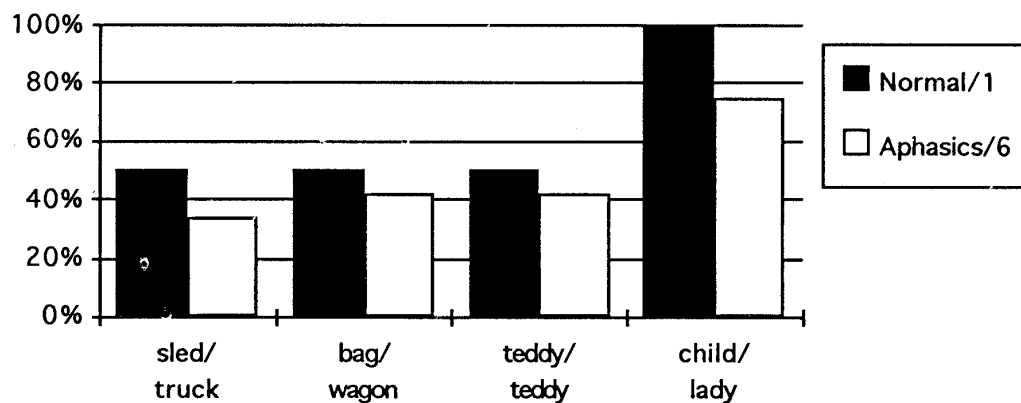
Conclusion, Study 2

Study 2 supported the hypothesis that empathic marking of the undergoer, including passives, would be more heavily used in describing events in which the undergoer had greater empathic appeal. Normals and aphasics were very similar, both in the general tendency and in the specific syntactic devices that they chose for marking the empathic focus of an utterance - although there are some unpredicted details in the pattern of results, which will be treated in the discussion section. The choice of marking devices will be discussed after the data for study 3 are presented.

C. Study 3: Context and question form

Hypothesis. The original hypothesis of Study 3 was that events which involve undergoers who are the topics of narratives would be more likely to be described

using the passive voice. This hypothesis was then extended to include all forms of undergoer fronting.

Topic, in the non-technical sense of the topic of a discussion, is what a discourse is 'about'. Various functional approaches to linguistics have developed several somewhat different technical uses of the term 'topic', but most of them (e.g. Givon 1981, 1983) depend on the text of a discourse as the basis for an operational definition -rather than basing it on the real, pictured, or imagined world encoded by that text - so no existing linguistic definition was fully usable. The topic of a cartoon narrative was therefore defined as the person whose history is followed. We defined this operationally as a character who was foregrounded when appearing in the illustrations, and who had at least two of the following three properties: being followed through time, appearing in all or almost all of the panels, or being reacted to by other characters. (By this definition, the 'Ball' story in Study 1 does not have a well-defined topic.)

(The present study does not attempt to differentiate between 'topicality' and 'empathy' as variables; one might expect that if a character in a story is the topic in the sense that she/he is followed through a series of pictures leading up to some event, the viewer might have more empathy toward this character. Finding an experimental way to tease apart these closely related linguistic variables will have to be a later development.)

We attempted to manipulate topicality experimentally by presenting a reversible-action panel in two conditions: first in isolation ('non-context condition'), introduced verbally in a way similar to the way the pictures in the 'brick' and 'snowball series; second, as the final panel of a multi-panel narrative('context condition'), with a more extensive verbal introduction.

Method

Subjects. The subjects in Study 3 were the same as in Study 2, as the test items for Study 2 were interspersed with those of Study 3. For English, 14 sets of oral responses were available from aphasic patients, and 10 from normal subjects. For Japanese, 6 aphasics and 1 normal participated.

Elicitation procedure. Subjects were presented with a picture of a 'reversible' situation - that is, one in which either the agent or undergoer could be chosen as the grammatical subject of the sentence. Here, as in Study 2, the empathic focus would or could be with the undergoer, depending partly on how the context is interpreted. There were six situations, the first four roughly paired, and the last two patterned

directly on the Inanimate/Animate materials used by Saffran, Schwartz, and Marin (1980):

> Big dog saves boy from drowning, Boy saves small dog from drowning;
> Teacher discovers boys smoking, Girl discovers teacher drinking;
> Baby is hit by fly ball, Boy is hit by stray bullet (agents visible in backgrounds).

Both oral responses and card-arrangement responses were obtained from all patients who were capable of giving them, but again there were not enough Japanese card responses for analysis.

The pictured events and the form of the examiner's question were designed to maximize the yield of undergoer-focused responses for analysis, under the provisional assumption that both these variables would affect the form of the response of both normal and aphasic subjects. Undergoers were made as attractive as possible (with the exception of the teacher sneaking a drink) - children, puppies, innocent pedestrians. Further, they were all severely affected (or potentially affected) by the depicted event: hit on the head, shot, drowned, expelled, fired from a job.

In the no-context condition, the target picture was presented alone, and English-speaking subjects were asked: "What happened/is happening to [undergoer]" - e.g., in the 'dog saves boy' sequence, "What happened to the boy?" In the context condition, the same target picture was presented as the last one of a sequence; the examiner narrated the story up to the final (target) panel, and then, indicating the target panel, asked the same question. Japanese subjects were questioned somewhat differently: in the non-context situations, the examiner asked the neutral question, 'Please explain (this)' ("Setsumei shite kudasai"). In the context situations, the examiner asked two kinds of questions. First, the question was posed neutrally as 'What happened' ("Doonatta?"); then, probing further, the question was posed with undergoer focus as 'What about [the undergoer]' ("[undergoer] -wa, doonatta?"). The results for Japanese and English will be analyzed separately where needed to reflect this distinction. As in Study 2, card responses were categorized as 'agent first' or 'undergoer first' arrangements, without regard to the verb choice or placement.

Analysis

Card Responses (English only). The overall yield of undergoer-first responses was quite high for both subject groups: Normals began with the undergoer in a

mean 3.9 of 6 opportunities in the no-context condition, and 3.4 of 6 opportunities in the context condition; aphasics gave means of 2.6 and 2.7 undergoer-fronted responses respectively in the two conditions. In the no-context condition, aphasic subjects placed the undergoer card first less frequently than normals did; in the context condition, responses of both subject groups were more similar, as shown in Figure 8. The context manipulation itself, however, had no significant effect on how often the undergoer was placed first by the aphasic subjects ($F(1) = .03$, $p = .873$ n.s.). For normals, there was a significant effect in a direction opposite to the prediction: fewer empathic markings were used in the context condition as opposed to the no-context condition ($F(1) = 25.00$, $p = .0011$).

Figure 8. Study 3, English Card Responses: Mean frequency of undergoer-fronting in the context vs. no context conditions (six opportunities):
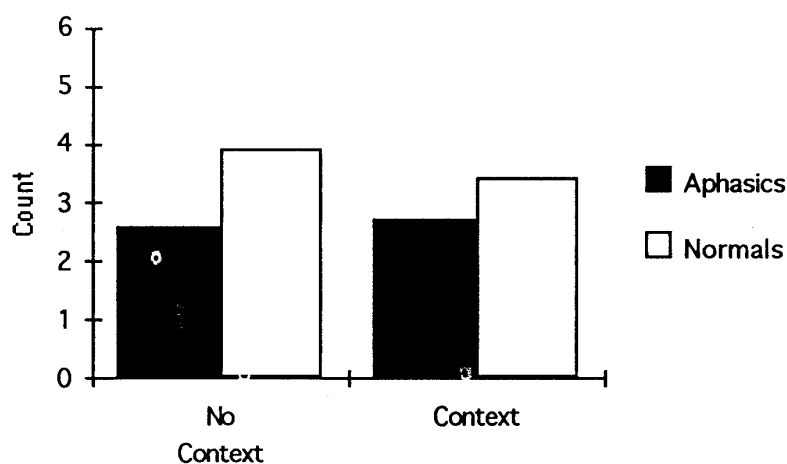
Oral responses. Oral responses were taped, transcribed, and coded as in Study 2 for order of mention, use of passive, and other undergoer-focus forms. The responses of the subjects were first categorized when possible according to whether the undergoer or agent was referred to first, and whether that reference was an overt mention or inferred from the choice of verb. Recall that in Japanese, subjects and objects may be omitted from sentences in which the speaker thinks that the context makes it clear who or what is being referred to, and that omission (zero-pronominalization) in Japanese is approximately equivalent to pronominalization in English. From the hearer's perspective, Japanese utterances utilizing zero anaphora are sometimes unambiguous, sometimes ambiguous. Similarly, **English**

utterances with both subject and object pronouns, like 'They hit them', are sometimes unambiguous, sometimes ambiguous, depending on the context.

Inferences as to which participant was the subject and which was object are often necessary when the subject is referred to by a zero-pronoun, as in this example:

<u>Dog saves boy</u>
EX: *kodomo-wa   doonatta?*
PAT: *tasukete   iru*
    Ø Ø   saving be
    (he) is saving (him).

If the utterance is error-free, then the agent of 'save' is being referred to first, but there is nothing in it that gives this information overtly. In other words, the order of mention of the undergoer is not independently determinable in either the Japanese patient's utterance or in its English translation 'He is saving him.' Such sentences were counted conservatively, as unmarked for undergoer.

<u>Results</u>:

English: The initial hypothesis was again not confirmed. For normals' oral responses, the context manipulation had the opposite effect from that which had been predicted: 43 of the 54 normal responses (6 for each of 9 subjects) were empathically marked in the no-context condition, but only 28 of 54 in the context condition (F(1) = 25.00, p = .0011). For aphasics, the context manipulation had no significant effect on the use of empathic marking; 52 of the 84 possible responses (6 for each of 14 subjects) were empathically marked in the no-context condition, and 51 of 84 in the context condition (F(1) = .03, p = .873 n.s.).

Separate statistical analyses were also performed on the most frequent types of empathically-marked responses, Undergoer Fronting and Passive/get-passive. The results were similar to those found for empathy markings as a whole: normals showed a significant decrease in the use of Undergoer Fronting and a non-significant decrease in the use of Passive; aphasic subjects showed no significant effect of context for either of these syntactic devices. For example, as Fig. 9 shows, normals used more passives in the no-context condition than in the context condition: 25 in no-context, 20 in context out of 54 response opportunities. For aphasics, the corresponding figures are 23 in no-context, 31 in context, out of 84 total response opportunities.

Figure 9. Study 3, English, Passives, Context vs. No Context: Mean frequency (per picture) with which aphasics and normals used passive constructions in context and no context conditions.
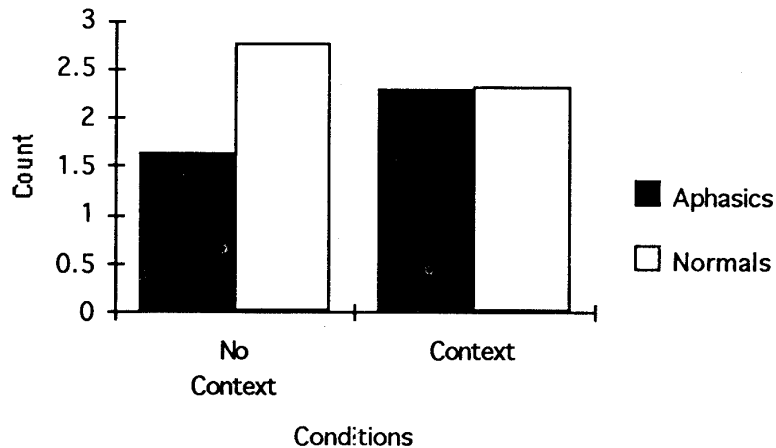
Figure 10. Study 3, Japanese, Passives, Context vs. No Context: Relative frequency with which aphasics and normal used passive constructions.
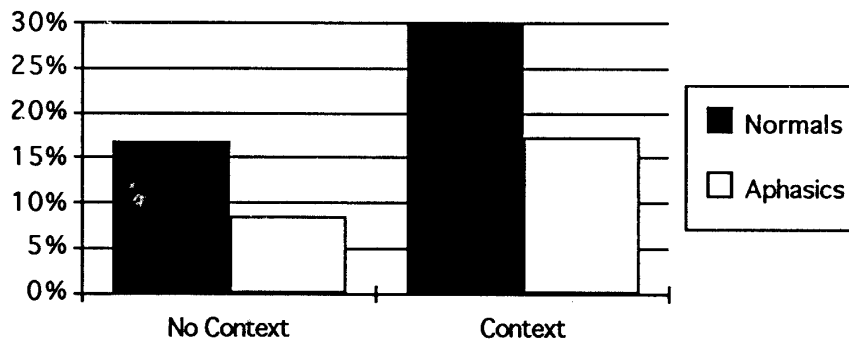
Japanese:

The data in Fig. 10 are given in percentages of passives in the total set of no-context vs. context condition responses, because of some differences in number of pictures seen by different subjects. The total number of aphasic occasions for response was 36 no-context, 64 context; for the normal, 6 no-context, 10 context. The Japanese responses do appear to show the predicted context effect on the use of passive constructions for the aphasics as well as the normal, but there are not enough data for statistical analysis.

Context condition: The effect of question form in Japanese. In the context condition, when the Japanese subjects were asked the 'general' question "what happened?", they began their answers with the undergoer in 20 out of 37 instances (32 responses from aphasics, 5 from the normal). There were 15 overt noun phrases (1 from the normal, 14 from the aphasics) in these responses, plus 5 unambiguous zero-anaphors (all from the aphasics) understood as referring to the undergoer. In contrast, when the subjects were asked the 'specific' question of the "What happened with the undergoer?" type, they started their answers with the undergoer in 34 out of 37 instances, using 25 (5 normal, 20 aphasic responses) overt NP's, and 9 (all from the aphasics) zero-anaphors understood as the undergoer (see Fig. 11). For the aphasic speakers, this increase in undergoer fronting when the specific question was asked was significant (chi-squared $(1,n=64) = 8.33$, $p<.005$), showing their sensitivity to the question form.

Figure 11. Study 3, Japanese, Undergoer Fronting, context pictures. The effect of the question form on the frequency of undergoer fronting.
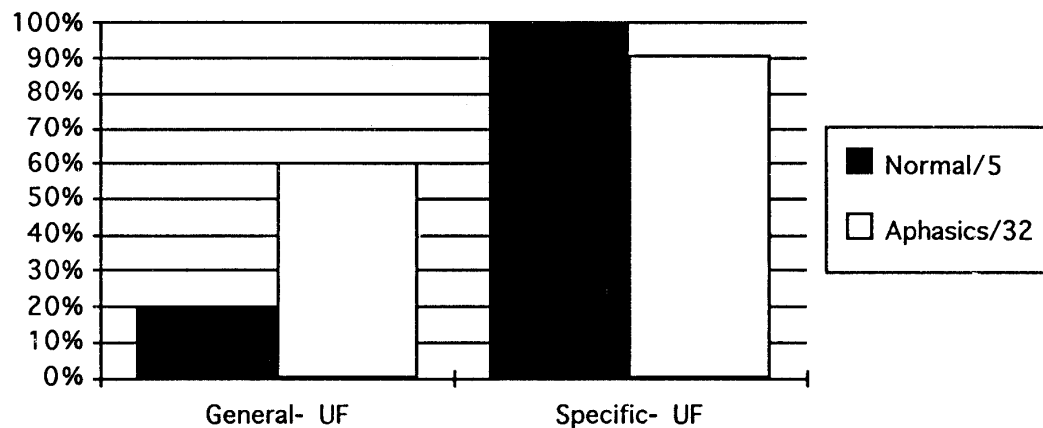
Discussion, Study 3

Topicality. The failure of Study 3 to demonstrate the predicted effect of topicality may mean that a topicality 'ceiling' was reached in the single panel of the no-context condition, or that the form of the examiner's question overwhelmed any topicality effect. Or perhaps the way in which the stories were constructed caused so many mentions of the undergoer before the final (test) panel that fronting him/her/it in

the test sentence seemed unnecessary to the speakers; cf. a typical example of single-panel Undergoer Fronting like 'He is drowning - boy save him.'

<u>The effect of question form on undergoer focus: comparison of studies 2 and 3.</u>
 Study 2 asked the general question "What happens?", while Study 3 asked the specific question "What happens to (the undergoer)?" Although there are many differences between the elicitation pictures, this difference still permits a rough comparison of the effect of question form. Recall that the difference in the question forms was originally based on the assumption that the yield of passive forms would be increased if the undergoer was mentioned in the question.

Undergoer-fronting, as defined, is sometimes realized by using the passive, but also by other strategies, e.g. 'He is drowning; the dog saves him'. Conversely, while passive in normals is virtually always accompanied by undergoer-fronting, this is not the case in aphasics, as they sometimes omit the sentence subject. Therefore, use of passive and use of undergoer-fronting were tabulated separately for both subject groups.

Our working assumption was confirmed: the use of undergoer-fronted forms in general, as well as passives in particular, was greater in Study 3 than in Study 2 for both normals and patients. In Study 2, patients used a mean of 1.7 instances of undergoer-fronting and 1.1 instances of passive in responding to the eight pictures; in Study 3, they used 2.9 instances of undergoer-fronting and 2.0 instances of passive in responding to only 6 pictures. This difference is highly significant: for undergoer-fronting chi-squared (1, n=70) = 11.04, p<.005. The figures and significance level for normals were similar, chi-squared (1, n=66) = 11.88, p<.005, as shown in Figure 12. For passive, aphasics' responses showed the same shift, chi-squared (1, n=47) = 7.68, p<.01, as did normals, chi-squared (1, n=54) = 18.96, p<.005.

Therefore, we see that the patients attempted to respond syntactically to the expectation of discourse-topic maintenance in the same way that the normals did, although they were sometimes unable to complete the sentence that they had begun.

Figure 12. The percentage of pictures for which aphasics and normals used either Undergoer-fronting or Passive.
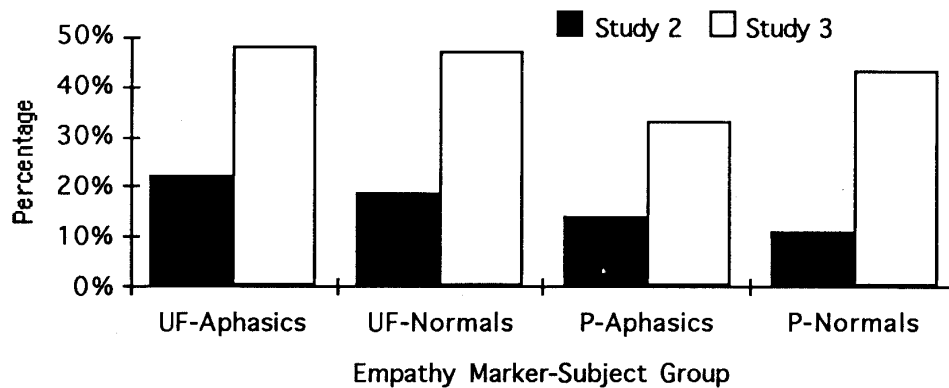
III. General discussion

A. Empathy, animacy, and strategy

Does animacy or empathy drive the encoding choice? In these studies, we can only tell by examining the choices of sentence subject (or topic, for Japanese) made when two participants referred to are both animate or both inanimate.

In Study 1, as discussed above, there are three frames, all in the 'race' story, which involve the action of an animate on another animate: someone gives the girl a number, the girl passes another girl, someone gives the girl a prize. There are four frames, from three of the other stories, in which inanimate acts on inanimate (wind blows off hat, boat bumps dock, ball breaks window, ball hits lamp). In these seven cases, animacy has no predictive power with respect to the encoding of the animates. Empathy predicts that the protagonist should be preferred as the sentence subject/topic in the animate-animate cases, and indeed this is the overwhelming choice for sentence subject (made in 52 out of 61 total responses). This preference holds for each of these three pictures for both normals and aphasics (see Figure 13). This indicates that empathy, rather than animacy per se, is the operative factor.

Figure 13: Choice of protagonist (presumed empathic focus) as sentence subject in 'race' story (Study 1), by aphasics and normals, Japanese and English combined.

A = aphasic   N= normal

■ protagonist = subject   □ other = subject
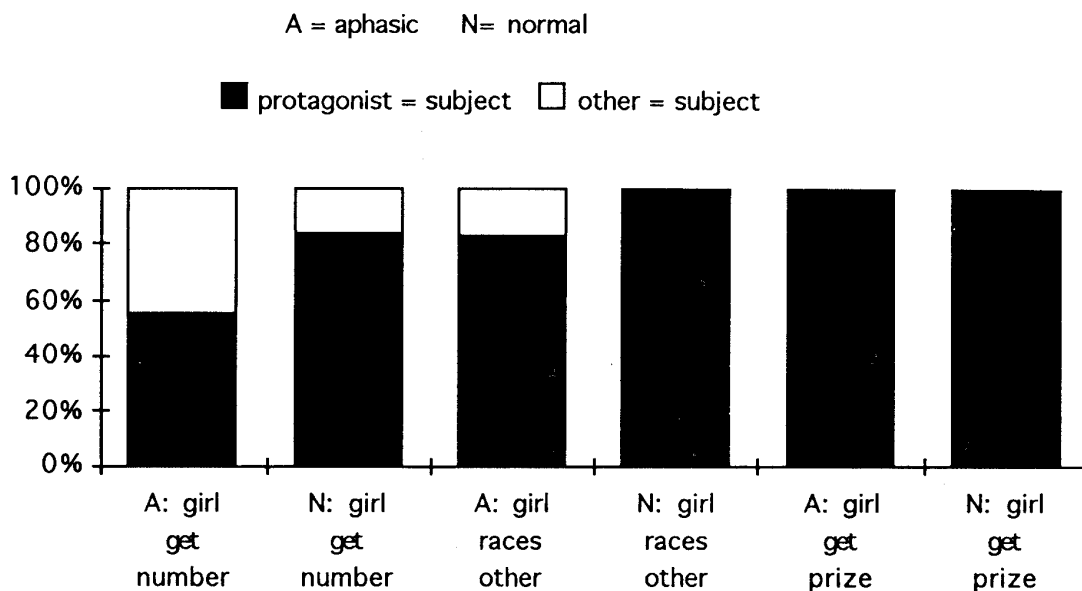
However, by our description of empathy as an emotional state of identification with another being, it is also the case that animacy should be a major factor - indeed, it is probably by far the most powerful one - in the choice of empathic focus, whenever the interaction is between animate and inanimate entities.

In the four inanimate-inanimate cases, empathy (if it is actually derived from the speaker's perception of his/her likeness to the character or entity) is unlikely to be 'with' an object. Can the concept reasonably be extended to such interactions, or is this pushing it too far? Perhaps, instead, one might have 'concern' for the fate of an object that could be damaged - derived either from its apparent value to another person, or from a more direct reaction to its potential value to oneself. However, to avoid introducing a new term, we will provisionally continue to speak of 'empathy'.

If value is a major factor in determining empathy, then, there should be a preference for encoding the hat, the window, and the lamp above the wind and the soccer ball; perhaps the boat should also be preferred over the dock, although there is no indication that the boat is in any way damaged by hitting the dock. But apparently, the factors of motion and causal power override any contribution from

'value' in the ball story, and are confounded with it in the 'boat' story, because the moving object is the preferred grammatical subject in expressing 'Ball breaks window', 'Ball hits lamp' and 'Boat hits dock'. Even in the 'hat' story, the wind is chosen as the subject more often than the hat; if value is a factor in the choice of subject, in these Study 1 stories it is clearly not strong enough to override causal power.

In designing Study 2, the teddy bear was chosen to be intermediate in animacy between the truly animate and the clearly inanimate undergoers; in fact, the data indicate that the subjects in the study reacted to it as intended. Since the teddy bear is thus quasi-animate, its animacy is confounded with its potential value. The only clear test for a value factor contributing to empathy is to contrast the empty sled and the same sled loaded with a bag of groceries (levels 1 and 2 of the 'snowball' series): the numbers are of course very small, but we find that the 14 aphasic subjects used a total of 5 markings on the bag vs. 2 on the empty sled, and the 9 normals used 2 on the bag vs. none on the empty sled. This suggests that, when all other factors are held constant, higher value of an inanimate undergoer indeed evokes a reaction of 'empathy' from narrators.

B. Choice of marking devices.

Data from Studies 2 and 3 were combined in order to compare the choice of specific empathic marking devices in patients versus normals in English and in Japanese. There were strong similarities across all four of these subject groups, as can be seen by inspection of Figures 14 and 15. Undergoer fronting, passive, and mental status attribution were the commonest forms of empathic marking for both groups of English speakers; undergoer fronting was the commonest form for the Japanese respondents.

Figure 14: English Empathy Marking, Studies 2 and 3 combined. Percentages are based on the total number of undergoer empathic markers used by each group: 180 from the 9 normal respondents, 214 from the 14 aphasics.

Multiple tokens of the same type of empathy marker uttered by a given subject for the same picture were counted as one entry.

UF: Undergoer fronting   P: Passive (be/get)   MS: Mental State
DD: Direct Discourse DX: Deixis   GA: Get-active   L: Luck
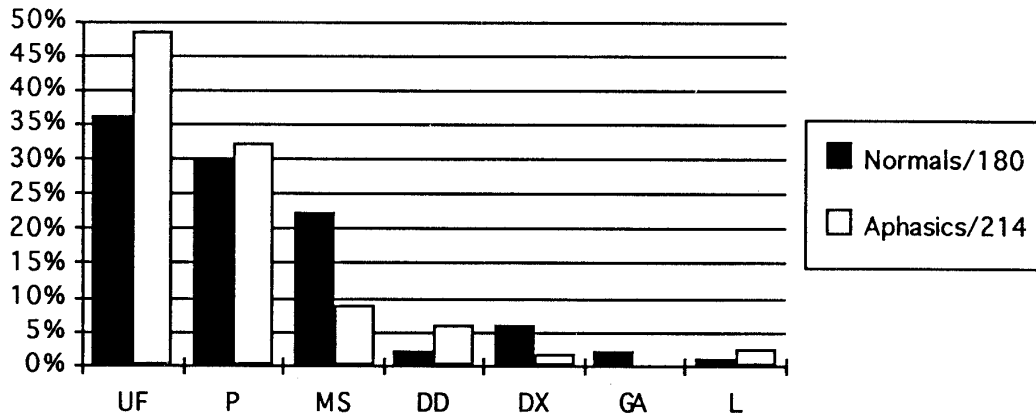
Figure 15: Japanese Empathy Usage, Studies 2 and 3 combined. Percentages are based on total number of undergoer empathic markers used by each group: 22 from the single normal respondent, 125 from the six aphasics.
Multiple tokens of the same type of empathy marker uttered by a given subject for the same picture were counted as one entry.

UF: Undergoer fronting   P: Passive   MS: Mental State
DD: Direct Discourse DX: Deixis
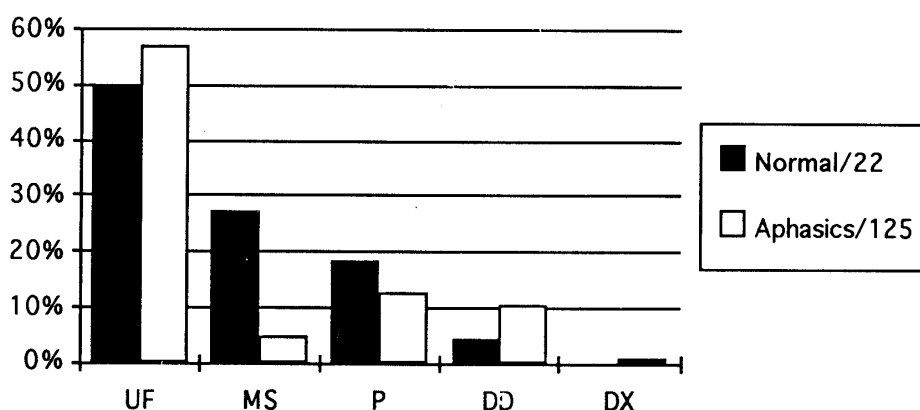
C. 'Strategy'. In the study of children, aphasics, and others who fall short of the idealized speaker-hearer, the term 'strategy' refers to the (perhaps conscious) use of some device to <u>supplement or replace</u> normal automatic ('algorithmic' - Caramazza & Zurif 1976) capacities for syntactic computation. Thus, Bever (1970) used the term 'word-order strategy' to describe English-speaking children's systematic errors in the comprehension of reversible passive sentences; Kolk et al. (1985, 1990) uses 'strategy' to describe agrammatic patients' choice of tenseless rather than tensed verbs, which removes the need to compute person/number agreement in Dutch and related languages.

    Some of our patients clearly used consciously-chosen devices to compensate for syntactic inadequacy - but we suggest that these strategies were not animacy strategies. Rather, they were 'active voice' strategies: the most striking example was Mrs. Kalmia's revision from animate-first to inanimate-first: "The baby - no - the baseball hits the baby." Our subjects - both normal and aphasics - also found many other ways of telling these stories without using the passive voice.

Beginning with the empathic focus, however, is not a 'strategy': considering Mrs. Kalmia's self-correction and others like it, we see that starting with the empathic focus appears to be an automatic, affective, pre-syntactic reaction in both normals and aphasics. This automatic reaction apparently must be overcome to keep syntax simple.

It must also be sometimes overcome for discourse reasons. For example, many false starts in normal adult narratives consist of mentioning a person who interests the speaker, and then stopping upon remembering that this person is unknown to the hearer and will have to be identified. Children are notorious for their failure to conduct adequate self-monitoring of this sort while telling about events that happened to them or while narrating picture sequences (Karmiloff-Smith 1979.) It is for this reason that we introduced the term 'speaker's impulse' at the beginning of this paper: starting with old information first is reasonably considered to be a strategy chosen by the speaker to maximize successful identification of the referent by the hearer, but starting with the empathic focus appears to be a matter of impulse, rather than a controlled activity.

D. On the nature of canonical form. Now let us return to the issue of canonical form, raised in the introduction. The Japanese data confirm the importance of canonical word order in production. To show empathy in Japanese, one can bring the undergoer plus its case marker to the front of the sentence. This is a simple matter of rearranging the word order, without any changes in the case marking of the noun or the voice of the verb. But Japanese patients made case-marking errors here, some of which amounted to full reversal errors, because when they started the sentence with the undergoer, they tended to put the subject marker on it (following canonical sentence form), and then to mark the brick as object or as locative, giving the equivalent of 'The lady lands the brick' or 'The lady lands on the brick.'

The notion of canonical form itself, however, bears further examination. Canonical form has come to be a hybrid syntactic-semantic notion, denoting a simple active declarative clause with agent as subject, e.g. "The cat chases the dog." Such a notion is quite problematic theoretically; is it the agent-first semantics, the active-voice morphosyntax, or both these factors together which make it a favored form for aphasic (and child) use and comprehension? Theories of autonomous syntax should indeed reject such a hybrid notion out of hand.

Note that most of the experimental work to date on the effect of sentence form on production or comprehension has been limited to the study of reversible

transitive (or di-transitive) actions, in which the simple (i.e. single-clause) active-voice clause is contrasted with the matching passive-voice clause.[3] Therefore, there has been a confound in experimental work to date between the semantic 'subject=agent' property and the morphosyntactic 'verb=active voice' property. So we ask whether the operative notion of 'canonicity' is really properly characterized by the hybrid syntactic-semantic definition, or whether looking beyond the class of highly transitive verbs which has been studied to date ('bump', 'hit', 'kiss', 'chase'...) would show that 'subject=agent' and 'verb=active voice' have separable effects. Specifically, perhaps it is only the morphosyntactic 'verb=active voice' property of the canonical form which makes it accessible to the aphasic speakers. In this case, the notion of 'canonical form' could be extended from the 'dog chase cat' type of sentence to undergoer-subject sentences like intransitive 'The boy falls' or transitive 'The girl receives a prize'.

The present studies suggest, tentatively, that 'verb=active voice' may be the key property of canonical form, rather than 'agent=subject'. Both the fluent and the non-fluent aphasic patients made considerable use of a few intransitive undergoer-subject active-voice verbs, as indicated in Table 4.

Table 4: Verb Phrase Type

Verb Phrase Type	Controls N	%	Patients N	%
Transitive	81	50	38	44.7
Intrans- Agent=Subject	24	14.8	16	18.8
Get-Passive	19	11.7	5	5.9
Intrans- Undergoer=Subject	10	6.2	12	14.1
Be-Passive	5	3.1	0	0
Ambiguous 'Be': passive/copula	4	2.5	4	4.7
Verb + Particle	4	2.5	0	0
Copula and Linking	3	1.8	1	1.2
Quotative Verbs	2	1.2	1	1.2
Ambiguous/Unclear/Idiom	10	6.2	8	9.4
TOTAL	162		85	

The four English-speaking Broca's aphasics who gave scorable narratives in studies 2 and 3 used undergoer-subject verbs proportionately more than they used get-passives or be-passives, although this difference was not significant (see Table 5).

This suggests that the Broca's aphasics found these active-voice undergoer-subject verbs relatively more accessible than get-passives, and chose them as ways of fronting the undergoer. This appears to imply that having subject = agent is irrelevant to accessibility, and therefore that only verb morphosyntax would be relevant to defining canonical form.[4]

Table 5: Undergoer-Subject Verb Phrase Types, Controls vs.Broca's

Verb Phrase Type	Controls (10)		Broca's (4)	
	N	%	N	%
Get- and Be-Passive	24	71	7	37
Intrans- Undergoer=Subject	10	29	12	63
TOTAL Undergoer=Subject Responses	34		19	

However, these findings must be interpreted with caution. The argument runs as follows. First: agrammatic Broca's aphasics who can give narratives tend to be able to use some get-passives, so comparing undergoer-subject verbs with get-passives and be-passives requires a statistical approach. For example, Mr. 'Zebra' and Mrs. 'Ivy' at severity 2.5 were the most severely impaired patients capable of giving a narrative response in this study,[5] yet each of them was able to use the get-passive a few times in response to the elicitation tasks of Study 2 and Study 3. (They had very few codable verbs, mostly active transitives, in the freer narratives of Study 1).

Second: while our four Broca's aphasics used undergoer-subject verbs proportionately more than get-passives and passives in Studies 2 and 3, this was mostly due to their use of 'fall', which was present in the elicitation protocol.

Therefore: to test whether active voice morphology alone is the critical factor in aphasics' preference for canonical form, or whether subject = agent is also part of what makes it accessible, elicitation materials must be designed to include other actions which elicit, at least in normals, a variety of high-frequency undergoer-subject verbs; and the use of undergoer-subject verbs will have to be compared with the use of get-passives and passives in an appropriate set of subjects. Such a test will have to be left as work for the future, but its importance for understanding the impairment(s) in aphasic syntax is clear.

E. Error patterns in comprehension and production of the passive voice: The interaction of pragmatics and syntax. In the effort to explain aphasic patients'

difficulties in producing and comprehending) passive voice sentences,
neurolinguistic research has focused on the internal structure of the passive clause.
Grodzinsky (1984, 1990) has elaborated an approach to explaining the
comprehension deficit based on the Government/Binding analysis of such clauses
in terms of NP movement from object to subject position, arguing that agrammatic
aphasics have difficulty in computing the abstract 'trace' that such movement
leaves. Caplan (1985) argues, alternatively, that such patients cannot compute
hierarchical structures; rather, they use a word-order-based strategy of interpreting
the first noun as agent. Both these researchers suggest that the interpretation of
referents is random when the patients' algorithm or strategy does not apply. The
Saffran-Schwartz-Marin group (Schwartz et al. 1980, Saffran et al. 1980) suggested
that agrammatic patients have trouble with mapping of structures onto semantic
representations, and so have to fall back on a comprehension strategy of interpreting
an animate noun as agent. Bates et al. (1988), Fujita et al. (1977, 1982, 1985), and
many others have shown that both fluent and non-fluent aphasic patients rely on
canonical word order in both comprehension and production; they have difficulty
in comprehending variant orders, whether in passives or in topicalized sentences.

All these approaches have been able to account for a substantial portion of the
experimental data on comprehension of passives; but, as noted, studies have been
restricted to verbs whose subjects in the active voice are agents. This necessarily
confounds the question of the relation of word order and semantics with the
question of the comprehension of functors and verb morphology: all the sentences
in which the subject is not the agent are also sentences in which the passive voice
verb is used. The studies have also been limited to sentences in isolation, and most
of them looked at comprehension only. Because of the focus on the issue of active
vs. be-passive and the difficulty of getting output with enough passive sentences to
study, even from normals, production studies have been less used (the notable
exception being Saffran et al. 1980). This means that the question of the nature of
aphasic speakers' very evident difficulty with the production of passive forms
(whether get-passives or be-passives) has been effectively set aside.

The present approach to the study of the production of clauses whose subjects
are not agents has been direct: to look at a wider variety of verbs, and to
systematically manipulate the content to be expressed. The data confirm the
dependence of both fluent and non-fluent aphasic patients on simple clauses using
active voice verbs, but they also indicate that the patients in our sample are not
dependent on the clause subject being an agent. The first general conclusion, then,

is that dependence on 'canonical form' may really be dependence on active voice verb morphology, and on the expectation that the mapping of noun phrases onto semantics will follow the pattern of the verb's most frequent semantic frame.

F. Towards a production model. How can these production results be given a psycholinguistic model? Let us assume that there is indeed a substantial population of agrammatic aphasics whose production and comprehension deficits are consequences of a single central deficit, or of parallel input and output deficits. Comprehension of a clause depends first on the parsing of the words, and then on the mapping of the parsed string onto an appropriate cognitive schema. A linguistic notion shared by all current major theories is that the mental lexical entry for each verb includes a set of listings of the ways in which that verb can assign semantic roles to its syntactic arguments. These are its semantic frames: for example, for 'close' and 'blow', the semantic frames include:

transitive:	(agent) close (undergoer)	Chris closed the door.
	(cause) blow off (undergoer)	The wind blew off the hat.
intransitive:	(undergoer) close	The door closed.
	(undergoer) blow off	The hat blew off.

For the sake of exposition, we will assume that the passives are also represented lexically in this way (if this is disagreeable to the reader, they may be considered to be rapidly constructed, instead).

passive:	(undergoer) be closed
	(undergoer) be blown
get-passive (1 argument):	(undergoer) get closed
	(undergoer) get blown off
get-passive (2 arguments):	(person affected) get (undergoer) blown off

Comprehension and production involve the activation of these frames in order to guide the correct assignment of NP's to semantic roles. For example, production of 'The hat blew off' would require a mechanism that could activate the intransitive frame (undergoer) blow off, and which could then guide the placement of the undergoer 'hat' into the subject slot. How is this to be accomplished?

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It would be reasonable to assume that all frames of a verb are initially activated by the verb, with the most frequent one having a lower activation threshold. In almost all cases, then, the active voice would have a far lower activation threshold than any passive form.

In production, one frame would become the most highly activated; this should be the one chosen by the speaker's impulse and judgement of the hearer's need, as discussed at the beginning of this paper. Suppose that this works by a preliminary emotional activation of 'hat' as focus of concern (as in Levelt's micro-planner) along with the propositional information 'hat' = undergoer (the entity most affected), (again as in Levelt's micro-planner). This combination of information should set up the lexical item 'hat' as the first NP to be produced. It should also activate all the undergoer-subject frames that a particular verb has: in the case of 'blow', this would be the be-passive, the undergoer-subject get-passive, and the intransitive. Of these, the intransitive, being active-voice, would have the lowest threshold level.

In this model, the production problem in aphasic patients could be simulated by any device - probably noisy channels would be sufficient - that would make it difficult for the passive forms to reach a level of activation greater than the active voice. Intransitives ('hat blow off') would be available - perhaps a little less so than corresponding transitives, but still much more than passives. Passive voice for transitive verbs which lack corresponding undergoer-subject intransitives, like 'hit', would not become more highly activated than the active; however, the undergoer would still be set up to go into the first slot, producing errors like our 'He hit on the head - it - the apple' and the full reversal errors of the Saffran, Schwartz, & Marin study.

Thus errors would arise primarily in experimental clinical elicitations, when patients are asked to describe situations in which inanimate objects act on animates or in which two animates of equal (un)importance to the narrator interact (compare 'The pig kisses the cat' with 'My wife called the doctor'). Furthermore, errors would be detected by the hearer only when the hearer was in a position to know what should have been conveyed.

This perspective allows us to account for the near-absence of observed reversal errors in agrammatic story narratives such as personal history and fairy tales (Menn & Obler 1990). The reason that these errors should rarely arise in narratives is that, in the narrative setting, there is usually a well-defined protagonist. Absence of errors like 'Red Riding Hood ate the wolf' can additionally

be attributed to the accessibility of world knowledge, for patients who have good self-monitoring skills.

These arguments work if and only if the agrammatic patient indeed knows the semantic implications of assigning one NP to the subject slot, and the other to the object slot. We conclude, from the near-absence of reversal errors in narratives, that this is the case: those agrammatics who are capable of placing a few words in construction with one another retain the understanding of the semantic implication of such constructions. What they lose first in English is the ability to access the morphology of the rare be-passive, and then the ability to access the much commoner get-passive; what they retain is the active-voice morphology, and the pragmatics-driven choice of which entity should be mentioned first. Years of experiments in the literature make clear the extent of their losses; naturalistic elicitations bring out their ability to compensate for them.

Now consider the comprehension side. A verb that is heard should activate all its associated frames, the most frequent ones the most strongly. These in turn should activate corresponding semantic mappings (for most frames, subject = agent; for undergoer-subject constructions, subject = undergoer); and those mappings in turn should activate appropriate cognitive schemata, e.g. ([subject] did [verb]; (something) did [verb] to [subject]). Frequency of use would ensure that the first of these should be the easier to arouse for most verbs.

Comprehension problems would arise when an undergoer-subject verb form, such as a passive, is given, but a [subject]-did [verb]-something schema is aroused too strongly. Proper adjustment of parameters should be able to give the near-random comprehension performance on passives that is reported for some aphasic subjects, and a different adjustment would simulate the better-than-chance performance observed in many others.

This conceptual model handles several problems that were outstanding in the literature. First, the animacy factor in the agrammatic reversal errors of Saffran, Schwartz, and Marin's experiments is accounted for in a more general framework that also explains why these errors are not observed in other settings.

Second, it promises to account computationally for the gradient of performance on passive comprehension that is observed across studies in a general sample of the aphasic population. Whether it should be regarded as complementary to syntax-internal accounts of these performance deficits, or as superseding them, will require much further theoretical and empirical elaboration.

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Acknowledgements

Footnotes

1: We here use 'focus' in a non-technical sense, rather than as a technical linguistic term.

2: The first four stories were designed for the present study with the help of our colleague Barbara Fox; the fifth is taken from the Standard Language Test of Aphasia (Nirayama conference), used in Japan.

3: Or else, simple transitive sentences have been contrasted with with similar transitive sentences containing various types of embedded clauses (e.g. "The horse bumps the cow who kicks the dog").

4: Overall, however use of passive(P/GP) by all of the patient groups combined was not different from normals: chi-square(1, n=460)=1.605, p>.10. Use of P vs. GP also was not significant: chi-square(1, n=123)=2.80, p>.05).

5: 'Zebra', 14 words total 'Cookie theft', maximum phrase length 3 on BDAE; 'Ivy', fewer meaningful words but 'Cookie theft' longer because her output was cluttered with the stereotypy "right about now")

*note for Table 2: These headings are theoretically somewhat questionable but reflect an attempt to be language-independent in choice of participant role descriptions.

Figure Captions

Fig. 1.
      1a: Ball   1b: Race   1c: Apple   1d: Boat   1e: Hat

Fig. 2. Number of propositions used to encode each event, English-speaking aphasics and controls.

Fig 3. Topic/subject choices for 'Hat', English and Japanese aphasics and controls.

Figs. 4a, 4b: Graded undergoer-animacy pictures for Study 2

Fig. 1b

Fig. 1a

Fig. 1c

p.46

Fig. 1d

Fig. 1e

Total Propositions Expressed
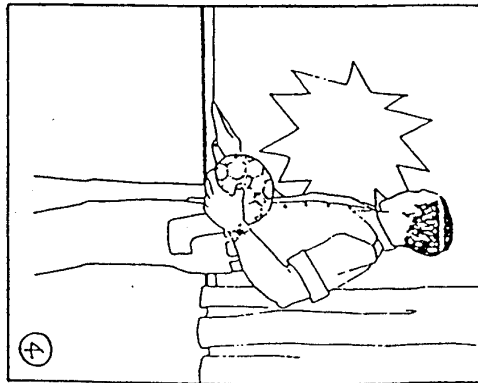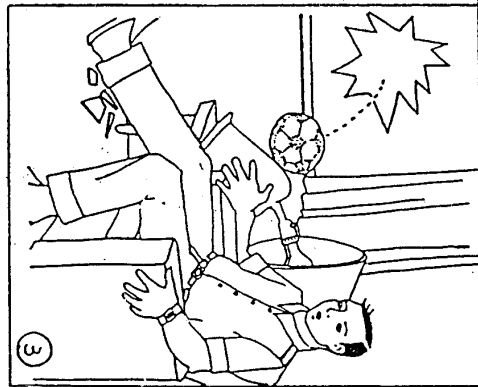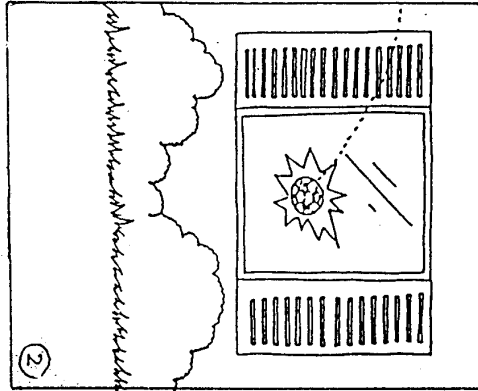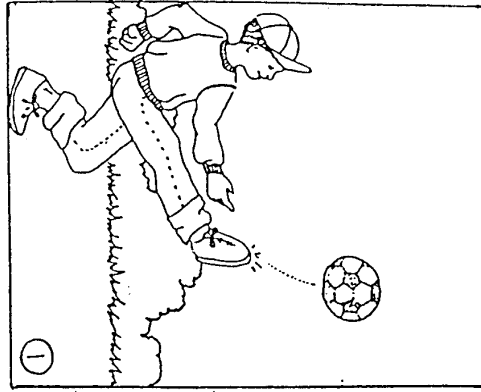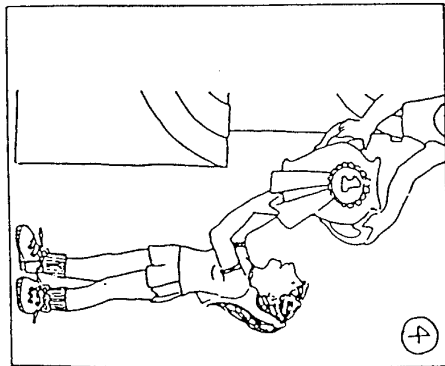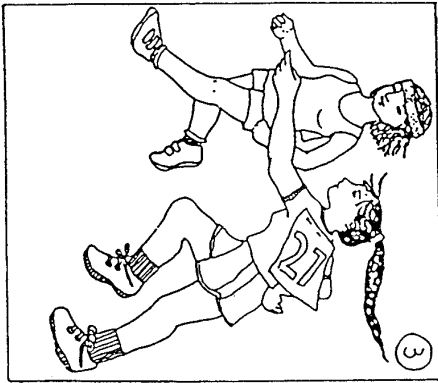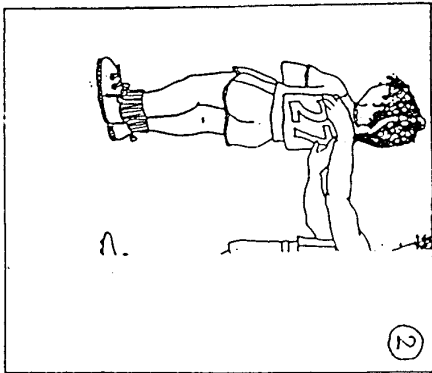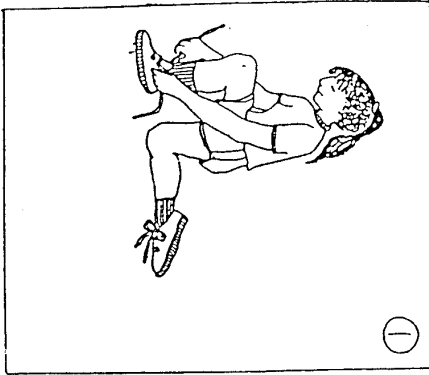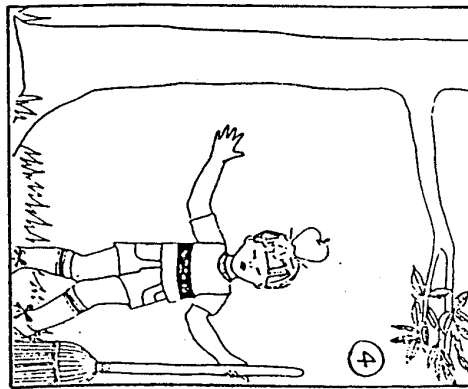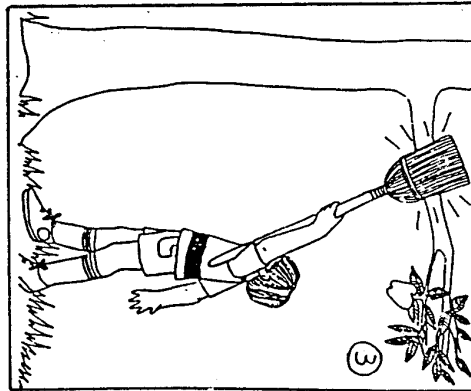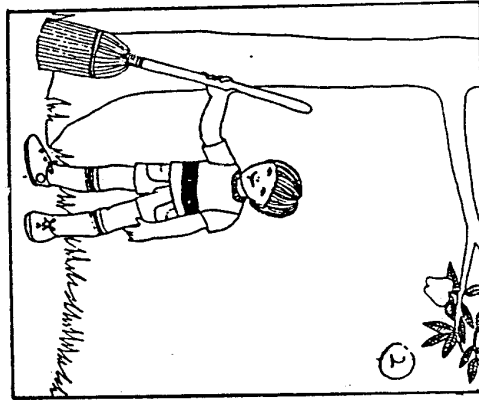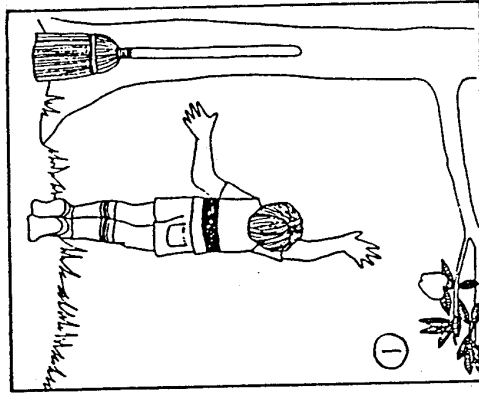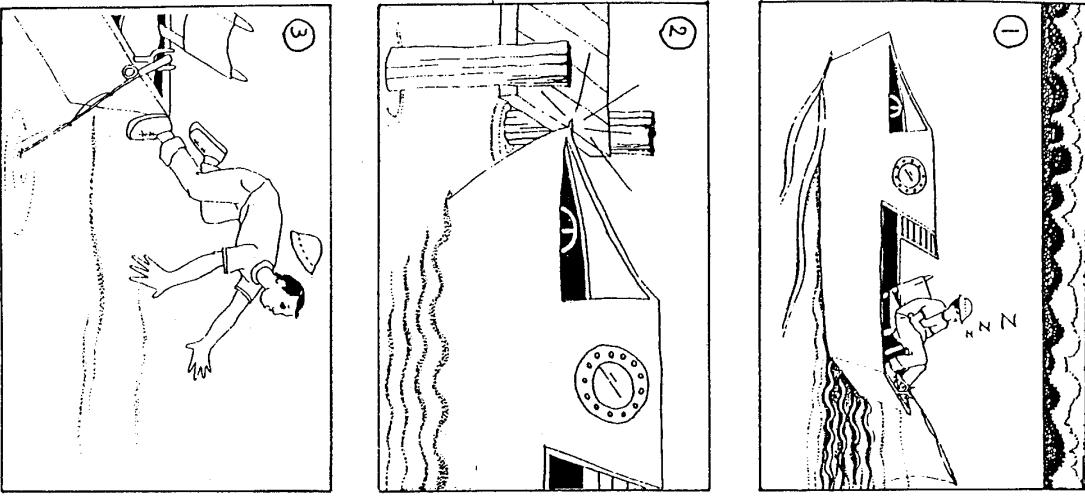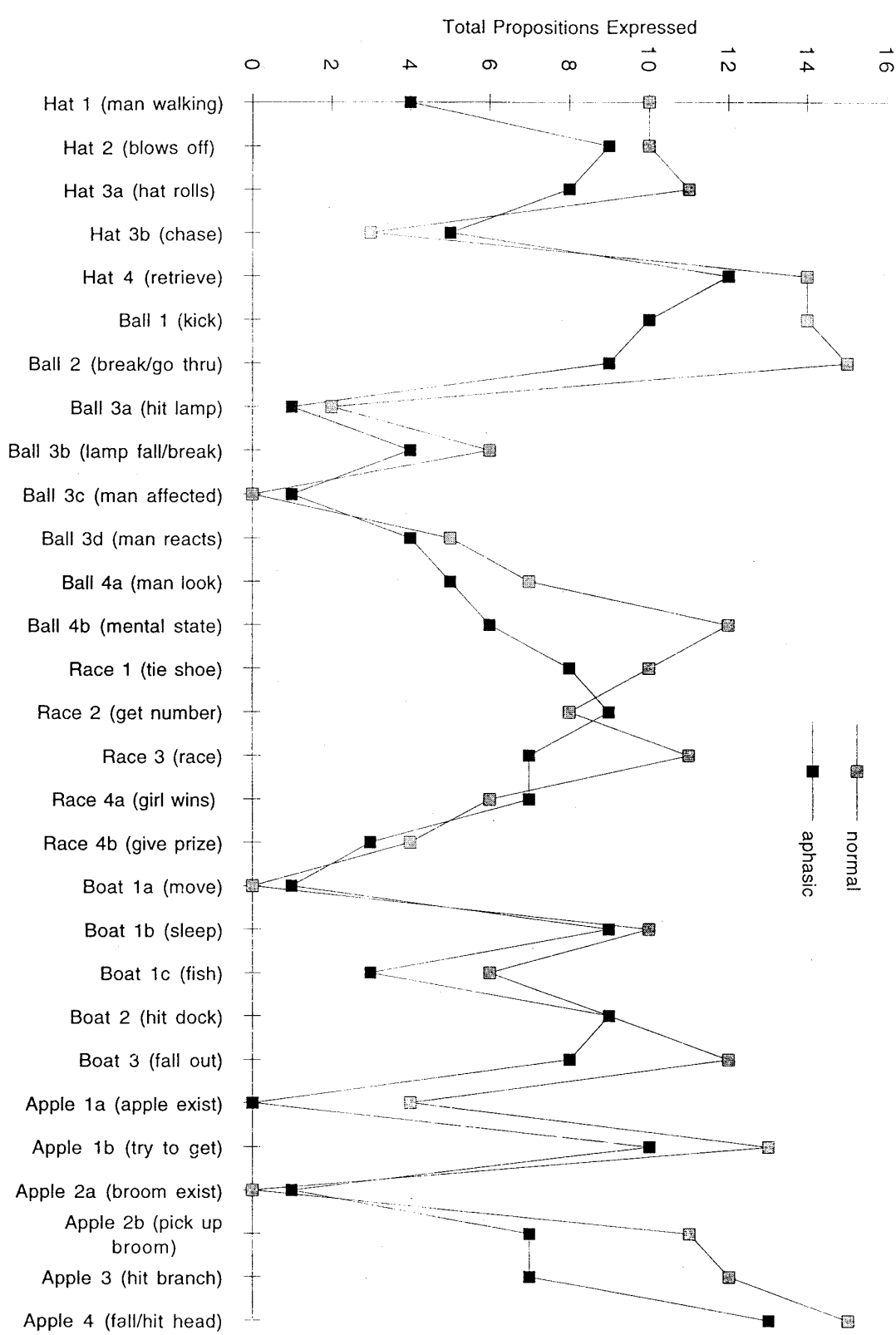
Figure 2

normal

aphasic
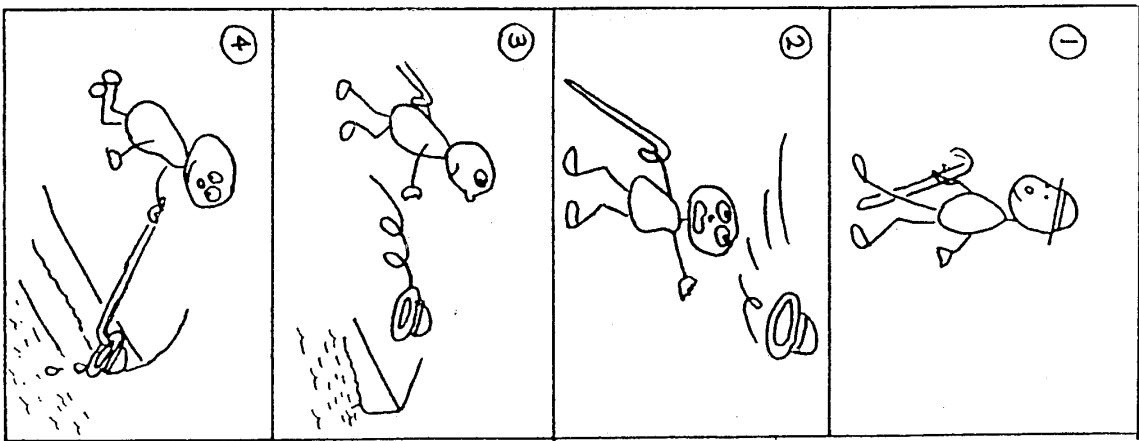
Figure 3

Referents encoded as Subject or Topic - "HAT"

Percent encoded as subject/topic

(dotted)	man	A = Aphasic
(hatched)	wind	N = Normal
(gray)	hat	
(black)	wind + hat	
(diagonal)	water	
(man or hat)	man or hat?	
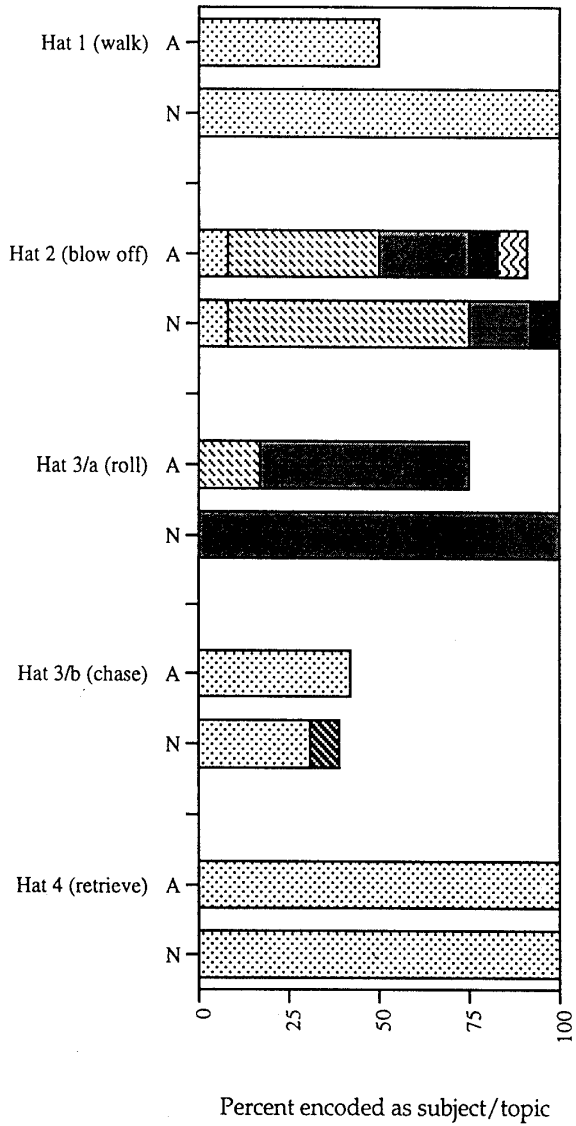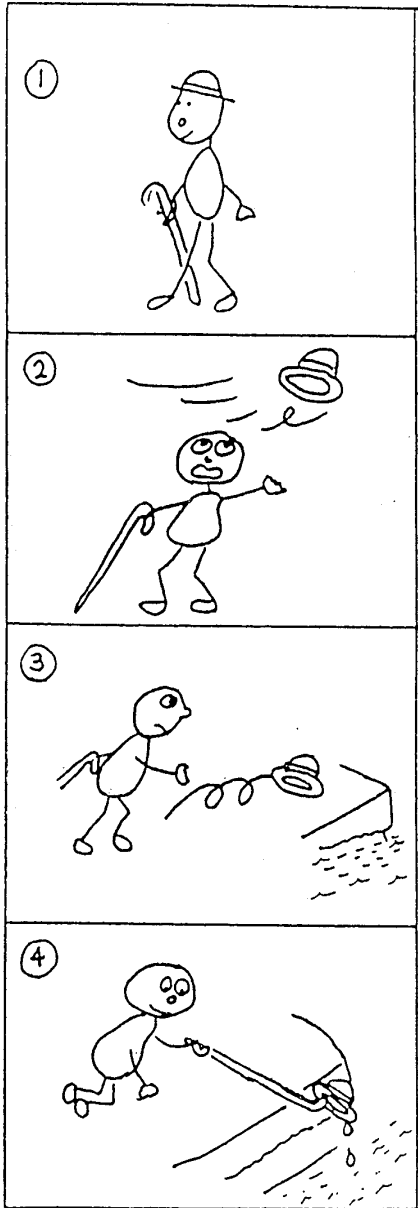
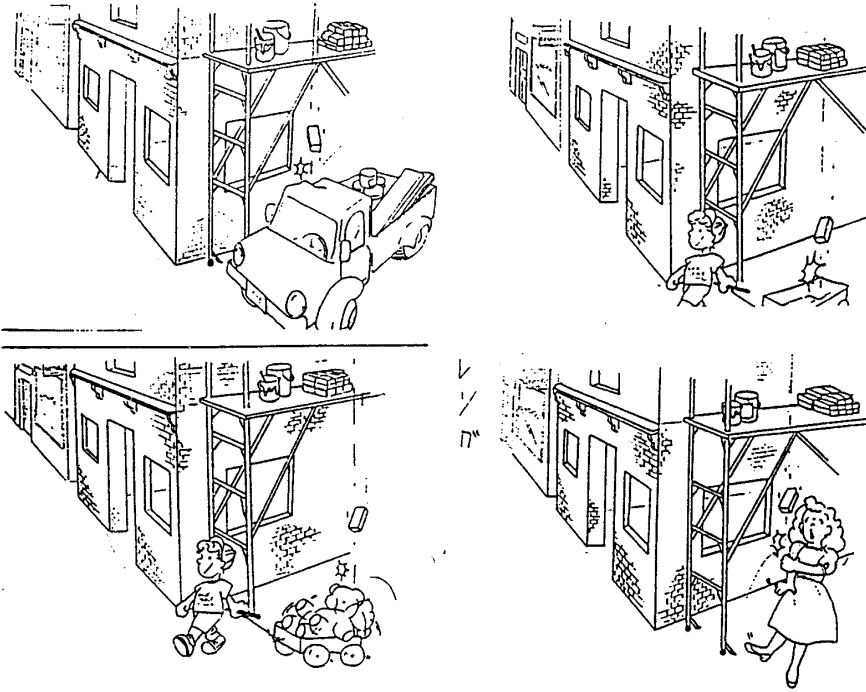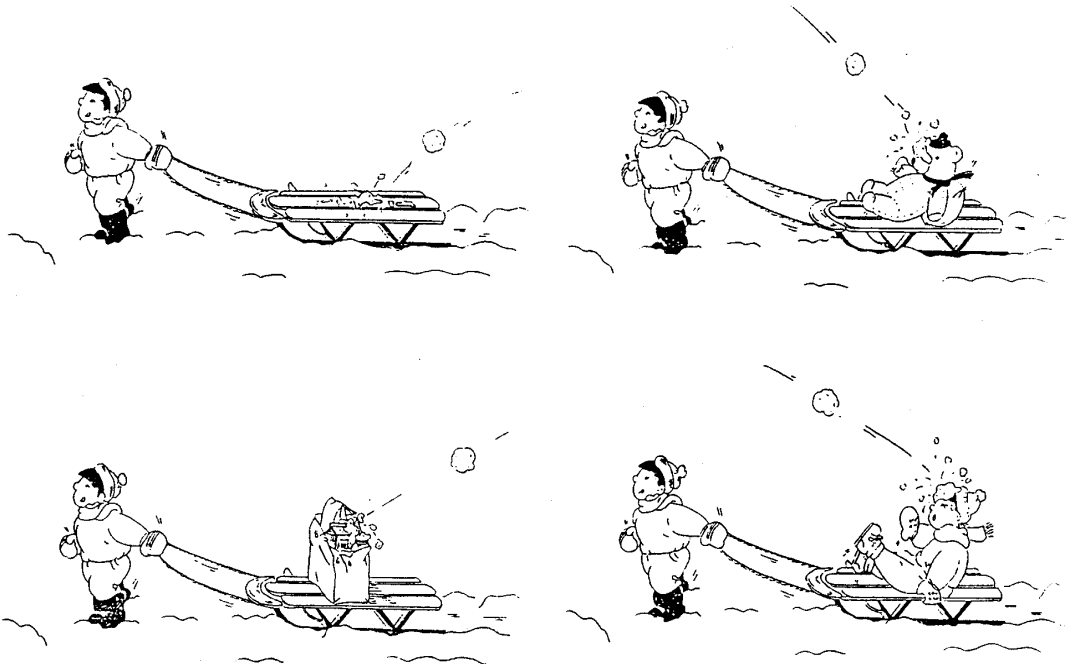Study 2: Graded undergoer-animacy pictures:

Figure 4b

Appendix A: Two 'Hat' and two 'Apple' narratives from Study 1:

Hat:
Mr. Zebra (Broca's, moderate):
>First, hot, uh hat . blow . off.
>#First, hat blow off

>then a then the one . round . water uh - sprin di . round . water
>#then the one round - water - spin the - round-water

>then hat go in . to water
>#then hat go into water

>uh cane
>#cane

>then uh. . . pull out water
>#then pull out water

Mr. Wallaby (anomic, moderate):
>Wind comes and pulls his hat away.
>Pulls - he pulls his scarf into the water and he picks it up with his cane with his with his with a cane.

Apple:
Mr. Zebra:
>boy can't reach apple
>#boy can't reach apple

>broom, uh, broom, i.de.a
>#broom, -idea

>I-franch, hit brants
>#branch, hit branch

>I think, so . uh drop apple . head.
>#I think, so drop apple - head.

Mr. Wallaby:
>Here he is trying to reach the- the apple, if it's an apple. He can't reach it so now he is taking a broom... xxx the broom and he going to xxx to the apple. He hits on the head- it- the apple and BOOM falls right on hhhis head. He didn't expect it, I guess.

Appendix B 5/23/95

Code name	Gender	Diagnosis	1st test	post onset	Handed-ness	BDAE severity	aud comp	Phrase length	Confront Nam/114	Etiology	Localization /source	Education	Notes
Salmon	male	Broca's	64	20	L > R	1	85%	2	12	cva	L- MCA dist	BS chem	almost no speech, card responses only
Heron	male	mixed nonfluent	54	23	R	1	20%	3	41	cva - embolic	L	HS+	
Koala	male	Wernicke's	87	63	R	1	?	7	untestable	cva	L ant&post	PhD psych	extremely empty speech
Wolf	male	anomic	62	44	R	1.5	90%	6	41	cva- aneurysm	L- F&T+deep/CT	MD	
Reindeer	male	Broca's	49	58	R	1.5	70%	3	58	cva	L- posterior F+	HS+2col	
Yak	male	Broca's	49	64	R	2	WAB 8.9/10	flu. 4/10	WAB 5/10	cva- subarach. hem	L- MCA dist/CT	BA anthro	
Hare	male	mixed nonfluent	76	98	R	2				cva	L- MCA and L- MS /USAF ant CA dist	colonel	
Kalmia	female	Broca's	68	61	R	2.5	80%	5	114	cva- embolic	L	2yr col	Yiddish 1st, English at 5
Zebra	male	Broca's	56	31	R	2.5	85%	3	92	cva	L- cen P/CT	HS+	
Ivy	female	Broca's	70	116	R	2.5	87%	2	102	cva- embolic	L- posterior F	MS in ED	stereotypy "right about now", WAB conduction
Ferret	male	anomic	50	55	R	3	85%	7	113	cva	L- subcort	BA++, enginr	some jargon
Camel	male	anomic	68	77	R	3	87%	7	111	cva- thr/emb	L- posterior F+	BA business	
Moose	male	mixed nonfluent	44	85	R	3	65%	6	86	aneurysm		J.D., Ph.D.	several other languages
Horse	male	Wernicke's	72	41	R	3	WAB 7, fl.9/1	0	WAB 8.5/10	cva- embolic	L- T and P	accountng	
Wallaby	male	anomic	72	23	R	3.5	83%	7	est 105	cva- thr/emb	L- MCA dist/CT 5/92	MA++	acquired stutter
Daffodil	female	anomic	41	16 yrs	R	3.5	90%	7	110	cva- embolic	L- CVA	MA lrn.dis.	
Falcon	male	anomic	64	46	R	4	90%	7	101	cva	L- F & P	H.S.	
Hyrax	male	Wernicke's	68	4	R	4	100%	7	114	cva	L- P/scan, EEG+	MA math + theol	almost fully recovered
Kudu	male	Broca's	65	69	R	not scorable				cva	L- MCA dist	BA +	card arrang. only, almost no oral output, would not permit taping

Appendix B-JPN

Code name	Gender	Diagnosis	Age-1st test
Hamaguri	M	non-fluent	
Ichoo	F	Broca's	52
Kamoshika	M	mixed	37
Kirin	M	Broca's	59
Koorogi	M	Wernicke's	50
Mammosu	M	trans.c.sen	66
Neko	M	mixed	16
Ohkami	M	Broca's	23
Oshidori	M	Wernicke's	47
Tanuki	M	mixed	
Tampopo	F	non-fluent	33
Yagi	M	Broca's	37