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

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Elicited narrative studies have shown 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 preferential access to ''canonical form'' might be a matter of surface morphosyntax, rather than involving semantics or more abstract levels of syntax. © 1998 Academic Press

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INTRODUCTION

This article presents evidence for preservation of pragmatic competence in the face of impaired syntactic output by aphasic speakers of Japanese and English. We show 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 reliance on ''canonical form'' shown by nonfluent (and many fluent) patients might be a matter of surface morphology/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 abilities such as appreciating humor, observing politeness, maintaining relevance, and producing well-formed narrative structure—four areas which have been investigated in aphasia (e.g., Bihrle, Brownell, Powelson, & Gardner, 1986; Brownell, Michel, Powelson, & Gardner, 1983; Christiansen 1995; Ulatowska, North, & Macaluso-Haynes, 1981; Ulatowska, Freedman-Stern, Doyel, Macaluso-Haynes, & North, 1983). At a more ''micro'' level, pragmatics is concerned with choosing among alternative sentence structures that can express essentially the same proposition (cf. Levelt, 1989), e.g., active, passive, impersonal, and multiple-clause structures. In this article, 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 and Wulfeck (1989) and Bates, Hamby, and Zurif (1983), who showed that patients had appropriate reactions to another micro pragmatic dimension, that of new vs old information.[1]

The concept of empathy is treated here as a psychological primitive, an attitude or state of mind toward a person (or other entity) which we can roughly describe as an attitude of ''identification with'' a participant in an

[1] 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. Even severely impaired patients typically 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?'' while lacking the ability to supply that answer. Conversation elicitation portions of standardized aphasia tests tacitly recognize this, in specifying whether the examiner is to use or avoid polar (''yes/no'') questions.

event. Kuno (1978, 1987) introduced the notion of empathy to current linguistics in terms of ''shared viewpoint.''[2] 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 (usually a person, an animal, or an institution) referred to in the utterance, whose viewpoint is shared by the speaker. Along with Kuno, we assume that this attitude of the speaker toward 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 emotionally neutral or because he/she does not choose a form which indicates the 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.

BACKGROUND

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 prelinguistic 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 what is shared knowledge, what has been previously mentioned, what the hearer should be able to infer, and what will be new information to the hearer. Such information is essential in deciding, for example, whether to use a pronoun or one of many possible full noun phrases to refer to the persons and objects under

[2] When it is important to make the distinction, we will use the term ''empathy'' for the speaker's affective state, and ''viewpoint'' for the cognitive orientation, if any, decodable from the form of an utterance. Cf. Nichols, 1984, which appears to make a similar distinction.

discussion: in beginning a narrative about an event that affected your uncle, does the hearer know, for example, that ''George'' is the name of your father's brother?

These discourse factors—setting, evaluation, information status—are *hearer-oriented;* that is, they concern how the speaker takes the hearer's needs and expectations into account (see Chafe, 1976; Lambrecht, 1994; Birner & Ward, 1996). 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). In particular, cognitive (prelinguistic) 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 emotional attractiveness (presumed to elicit an empathic reaction), motion or other evident power to cause an event, and novelty/unexpectedness are all speaker-oriented factors which affect the way in which an event is described by both aphasic and normal speakers (Menn, Fujita, Morishima, Kamio, & Sasanuma, 1991; Menn, Kamio, Hayashi, Fujita, Sasanuma, & Boles, 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.[3]

In English, both the *be*-passive and the *get*-passive make the undergoer the subject, so the passive voice almost always brings the undergoer toward 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).[4] We will refer to passive and other constructions that

[3] Extensive cross-linguistic experimental work on normal subjects by Sridhar (1989, p. 223) supports these findings: ''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.

''Undergoer-subject'' verbs, in which the grammatical subject of the active voice is not the agent (''Susan got a prize,'' ''The door closed''), will become important to the discussion later.

[4] 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. (Related functions, such as deflecting attention from the agent, are less relevant to the present paper—see Givon, 1981; Shibatani, 1985.)

bring the undergoer to the front of a sentence as ''undergoer-focusing'' forms.[5]

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 (1991) says with respect to children's 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.

Caveat: this psychological explanation of the function of passive in terms of word order is only partially adequate across languages, because in many languages (including Japanese) 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. ''Order-of-mention'' explanations do not apply directly to sentences which use zero-pronouns to refer to the participants.

[5] We here use ''focus'' in a nontechnical sense, rather than as a technical linguistic term.

TABLE 1
Japanese Verb Forms

	Transitive active	Intransitive	Passive of transitive
''Save''	Tasukeru	Tasukaru	Tasukerareru
	Save	Survive, remain alive	Be/get saved
''Find''	Mitsukeru	Mitsukaru	Mitsukerareru
	Find	?Appear (after search) —involuntary; exist	Be/get found
''Hit''	Ateru	Ataru	Aterareru
	Hit	Be/get hit	Be/get hit
''Shoot''	Utsu	(No intransitive)	Utareru
	Shoot		Be/get shot

In Japanese, there are many pairs of (historically) morphologically related verbs where one member of the pair is intransitive 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.[6] See Table 1.

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., defocusing 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.

[6] Some Japanese undergoer subject intransitives can have an explicit agent, whereas English intransitives cannot. However, the agent's actions are construed as involuntary, cf. the restrictions on the English intransitive construction, which may express cause or experiencer, e.g., ''The hat blew off in the wind.'' (*by the wind), or ''The vision appeared to the traveler.'' (*by the traveler).

EXPERIMENTAL STUDIES

We carried out three studies to test the hypothesis that aphasics and normals alike prefer 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, Schwartz, and Marin (1980) are consequences of this preference. We suggest, finally, that the subject/object reversal errors that Saffran et al. (1980) 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.

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 not selected for diagnostic type: we collected data from 9 English-speaking patients ages 41–72, modal age 64, capable of giving narratives (2 moderate Broca's, 1 moderate mixed nonfluent, 1 anomic, and 3 mild fluent aphasics) and 9 Japanese patients ages 16–50, modal age 34 (3 moderate Broca's, 5 moderate mixed nonfluent, and a mild Wernicke's aphasic). All were right-handed and had suffered a single left-hemisphere CVA. Responses were also obtained from 10 healthy English-speaking controls ages 51–77 and 4 healthy Japanese controls ages 38–55. 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. (See Appendix B for further subject information.)

Stimulus materials. Five 3- or 4-frame narrative cartoon strips were used, resulting in a total of 19 frames (Figs. 1a–1e). 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 nonagentive intransitive actions.[7] 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

[7] 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), by Tsuneo Hasegawa, Keiichi Takeda, Ichiro Tsukuda, Aiko Takeuchi, and Asako Wada. Tokyo, Homeido, 1977.

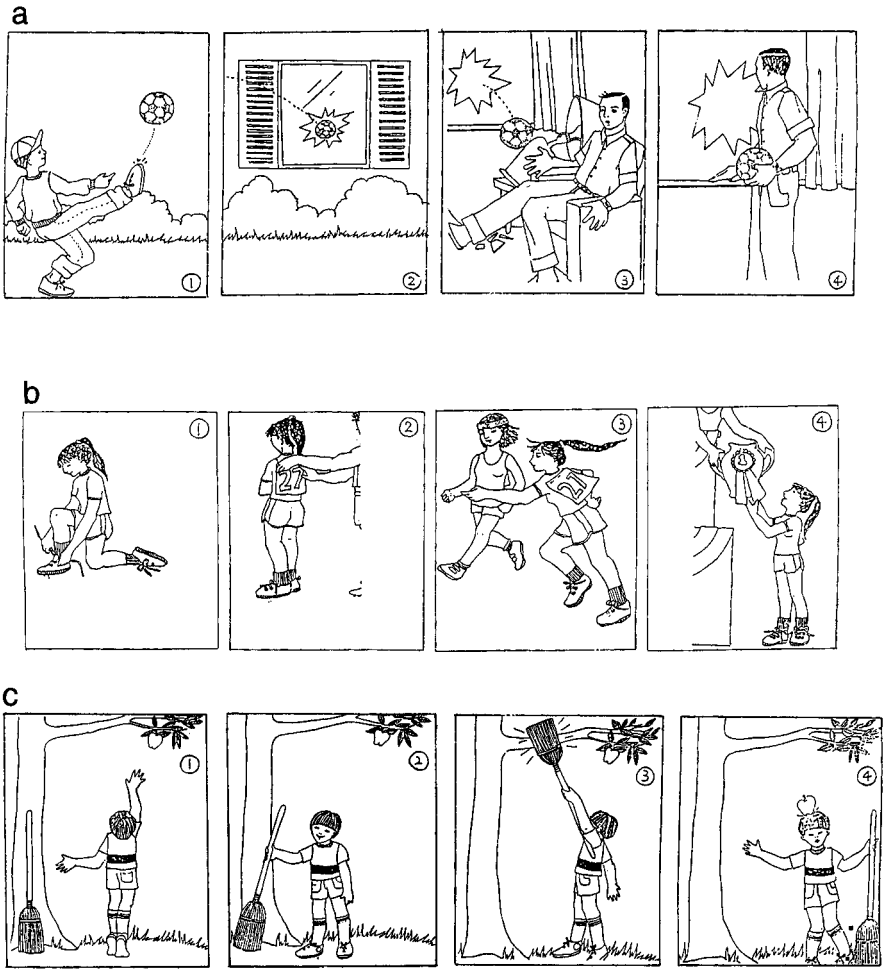


FIG. 1. (a) Ball; (b) Race; (c) Apple; (d) Boat; (e) Hat.

whether the protagonist or another person was the agent in Animate–Animate (A–A) interactions.

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. (in press).

Event analysis. In order to compare responses across subjects, the cartoon stories were analyzed as a series of events which reflect subjects' typical responses (Table 2, Event Analysis). Both normals and aphasics interpreted the pictures as events in coherent stories. For example, in describing Frame 1 of Apple (Fig. 1c), subjects were asked to interpret the boy's posture in the context of the whole story. Normals gave responses like ''The boy is trying to

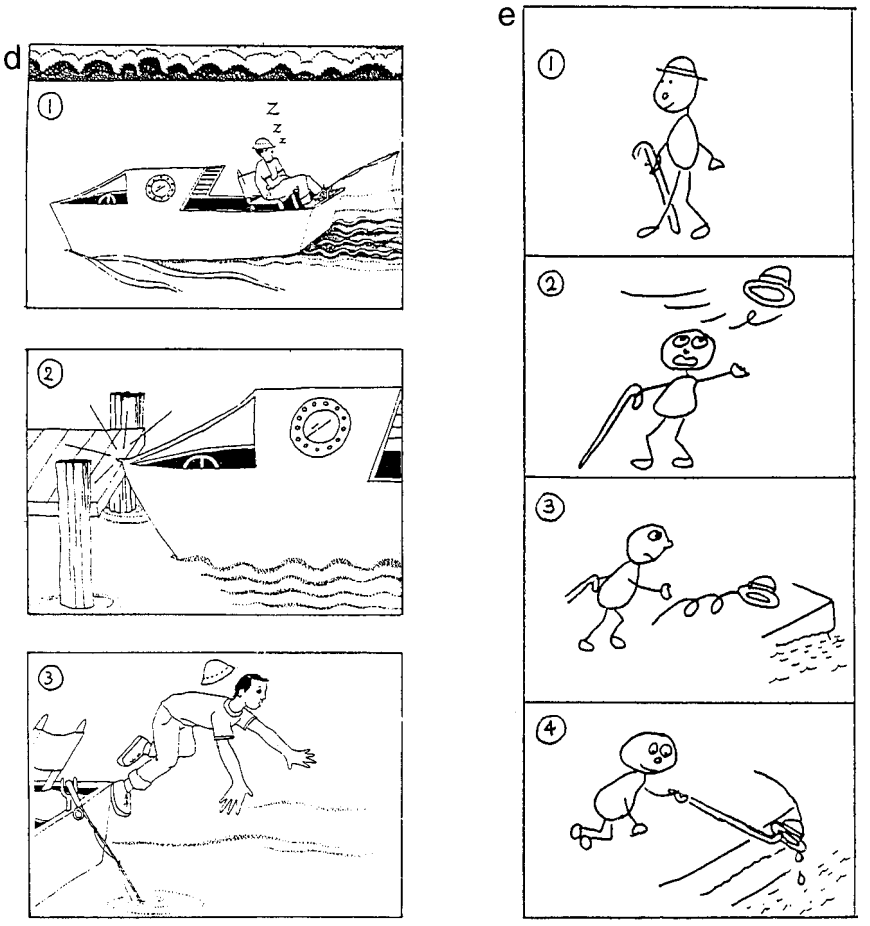


FIG. 1—*Continued*

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 with his arm up in the air.''[8]

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, first entity affected, second entity affected) were chosen to be independent of the particular syntactic

[8] One English-speaking control, a retired engineer, mentioned that the fisherman falls in the wrong direction with respect to the Law of Conservation of Momentum, a point which we had overlooked.

TABLE 2
Analysis of Events in Elicitation Cartoon Frames

Story/panel	Agent/cause	First entity affected[a]	Second 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

[a] These headings are problematic, but reflect an attempt to be language-independent in the choice of participant role descriptors.

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 these decisions; the ''event analysis'' is intended only as a framework for organizing the narrative content 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, nonfluent:

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

using cane - skillfully - ∅ - pulled [it] up

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

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

Mr. ''Zebra,'' moderate Broca's aphasic:
Hat 4: cane . . . then ∅ pull ∅ 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. 1a), 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 combinations 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); judgment 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

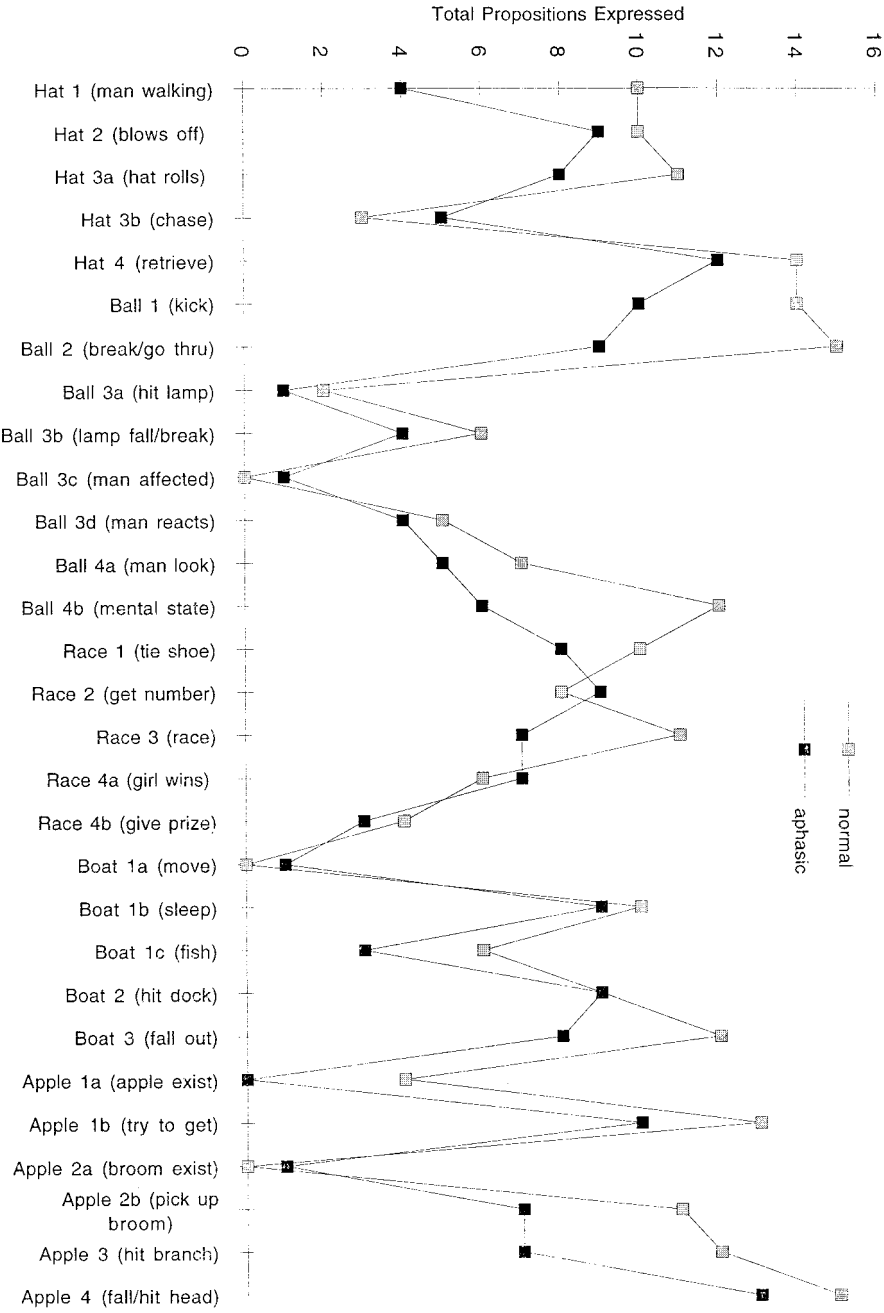


FIG. 2. Number of propositions used to encode each event, English-speaking aphasics and controls.

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 quite high, $r = 0.871$. 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.

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 high, $r = 0.80$. 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:

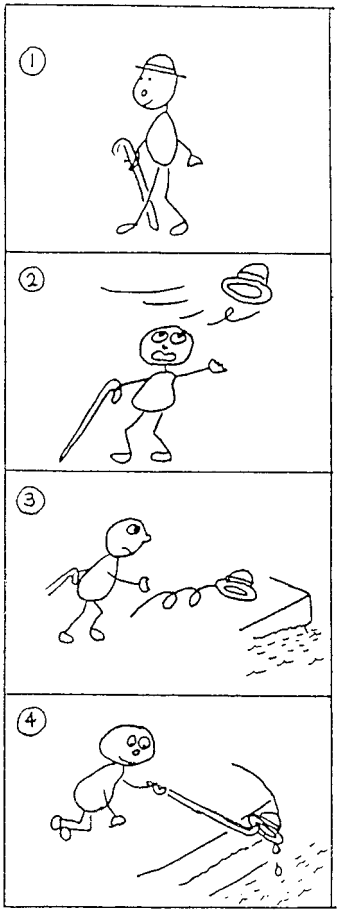
Ms. Tampopo, nonfluent: Ball 4

Ntoo	*nto*	*ne*	*''gomen ne.''*	
well:INTERJ	well:INTERJ	PART:SFL	''sorry	PART:SFL''

However, in Study 1, none of the normals 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 switching 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. Inspection of the full data set indicates a strong similarity between the aphasics and the normals in their choices of which entity to encode as the subject/topic in each frame, although this is difficult to treat statistically (Menn, et al., in press).

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, and 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. Ambiguous referring expressions were counted as .5 for each



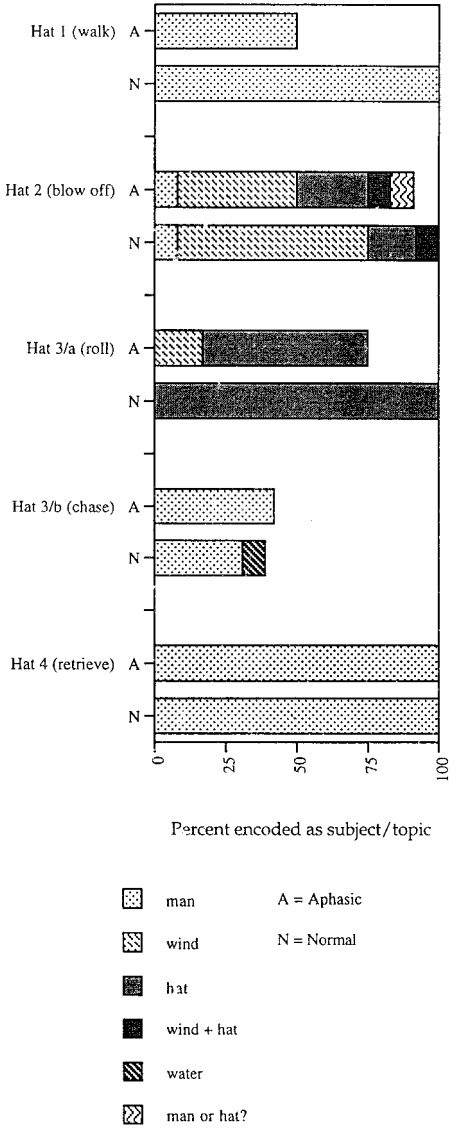


FIG. 3. Topic/subject choices for ''Hat,'' English and Japanese aphasics and controls.

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

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), χ^2 (1, $n = 567$) = 33.26, $p < .005$.

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 for 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 for any of the other frames, where an animacy strategy could not apply, or could not fully determine the order of the people and the 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, because the events often may 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 only with encoding the object, not the people. As it turns out, the people were 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''/''Syoo-dyoo o moratte iru''). 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'').

However, the absence of reversal errors does not mean the absence of problems in finding the syntax needed for encoding argument structure. Two of the frames that can 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 subjects and verbs, 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 nonfluent English-speaking patient and five normals used *get*-passives in Race 2; two fluent patients and the same nonfluent 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 nor-

mals) or OSV order (one instance for each group), so few conclusions of interest can be drawn about voice from this study.

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

We hypothesized, first, 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. Second, 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.

Method

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 10 controls were used; there were also 14 aphasic subjects who were able to give narrative responses, with 9 controls. The 14 oral aphasic responses came from 5 Broca's, 1 mixed nonfluent, 2 Wernicke's, and 6 anomic patients. The card responses differed only in that 1 mild Wernicke's patient replaced 1 severe Broca's patient. Further patient data are tabulated in Appendix B.

The Japanese subjects of Study 2 who provided oral responses were 6 aphasics and 1 normal. Four aphasics participated in both Study 1 and Study 2. Card data were limited to 2 aphasics who were among the 6 providing oral responses, so these data were insufficient for further analysis. The 6 oral aphasic responses came from 1 moderate Broca's patient, 3 moderate mixed nonfluents, and 2 mild Wernicke's patients.

Elicitation materials. Each series of graded undergoer-animacy pictures had four levels of putative empathic appeal of the undergoer. The first series (''Brick series,'' Fig. 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,'' Fig. 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 the sled. 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?''

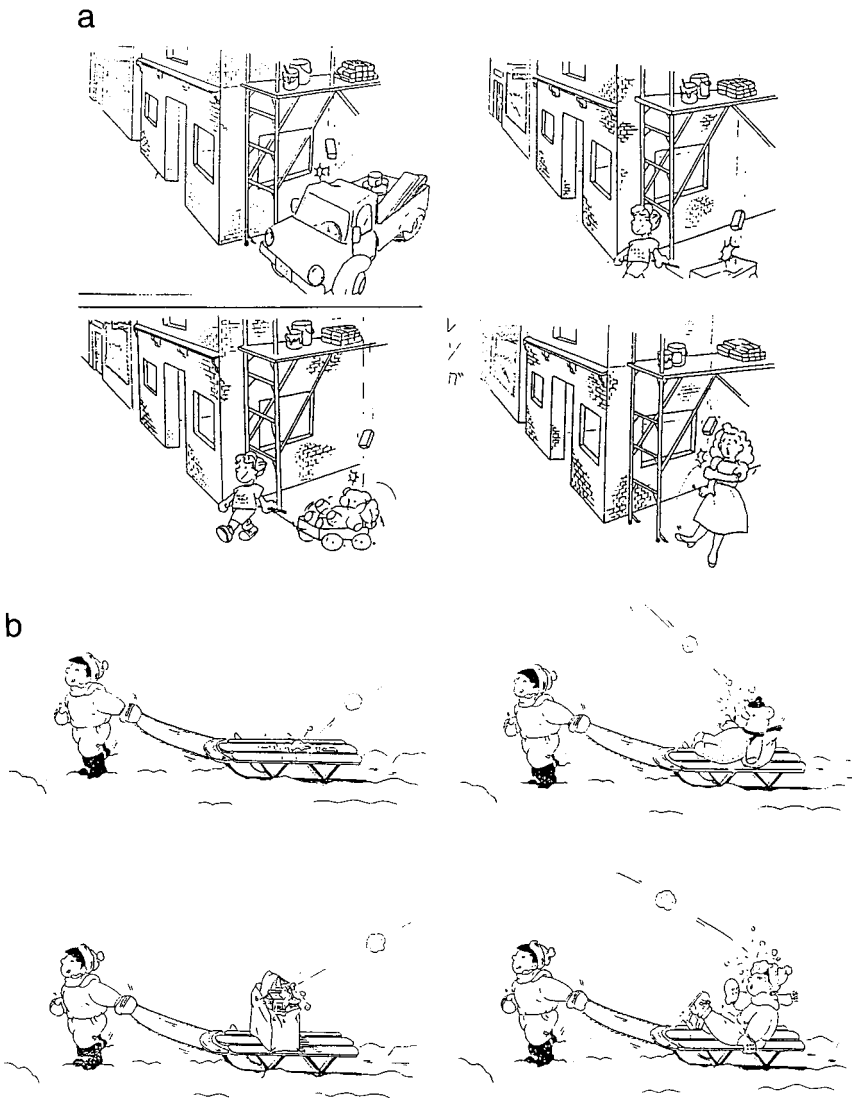


FIG. 4. (a) ''Brick'' series; (b) ''Snowball'' series.

In Japanese, the subjects were asked the neutral question ''Please explain (this)'' (''*Setsumei shite kudasai*'').

Two response modes were used: oral responses and the 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

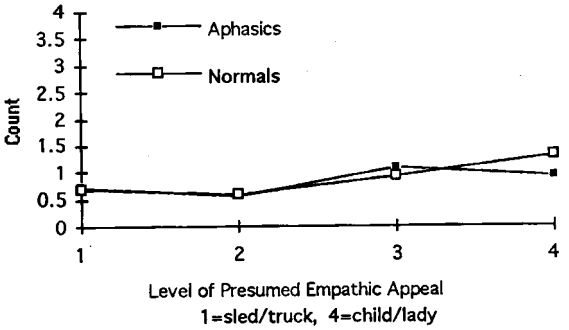


FIG. 5. Study 2, English Card Responses, Brick and Snowball series combined. Mean frequency (out of four opportunities) with which aphasics and normals fronted the undergoer, according to level of presumed empathic appeal.

verb or to use the BY card. The position and the choice of the verb form were thus disregarded in the scoring.[9]

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 Fig. 5).

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 hypothesis that normals use more undergoer fronting when undergoers have greater presumed empathic appeal, and the results weakly support the same conclusion for aphasics. 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 nearly random (possibly due to reading deficits), rather than syste-

[9] This decision was made because of 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.

matic. 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 from (Passive/*Get*-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.

Examples

Mrs. ''Kalmia'' (moderate Broca's; teddy bear picture, Brick series)
marking: 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 Fig. 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, $F(1) = 19.65$, $p = .0007$]. 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

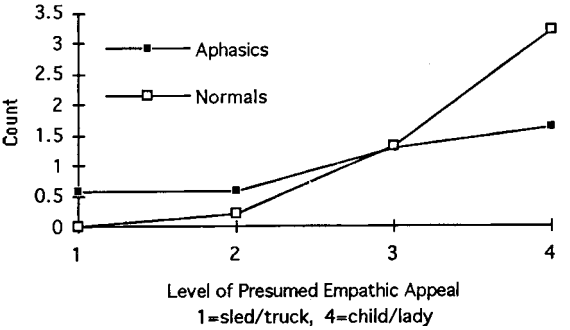


FIG. 6. Study 2, English Oral Responses. Mean total number of empathic markers (no ceiling) used by aphasics and normals for the undergoer, at four levels of putative empathic appeal.

to show a significant empathy gradient in the use of these syntactic devices [for Undergoer Fronting ($F(1) = 2.10$, $p = .1711$ ns); for Passive/*get*-passive ($F(1) = 1.80$, $p = .2025$ ns)]. Instead, their use of nonsyntactic 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 of the aphasics' 14 uses of passive were contributed by a single fairly well-recovered nonfluent aphasic, Ms. ''Daffodil,'' who seemed to be perseverating, as she used the passive in 6 out of her 8 responses. The 8 instances of passive voice among the 9 normal subjects were much more evenly distributed across their 72 responses to the 8 pictured events, although 1 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 seven subjects (one normal, six aphasics).

Because zero-pronouns are so heavily used in normal Japanese, it was necessary to devise a consistent way of scoring undergoer fronting in utterances where one or both referents were missing. Japanese utterances were thus counted, conservatively, as having canonical SOV order unless there was audible evidence to the contrary. Therefore, (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, when the verb was transitive and the undergoer was clearly its *object*, the undergoer was not counted as fronted (since the zero subject pronoun might be thought of as coming ''first''). (3) Other zero-pronoun cases were treated as indeterminate and were not scored.

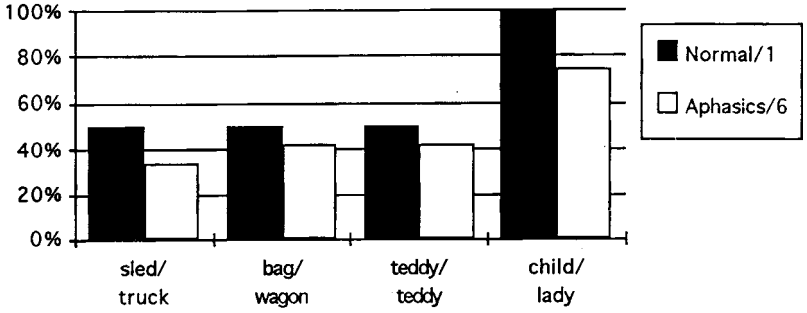


FIG. 7. Study 2, Japanese Oral Responses, Brick and Snowball series combined. Percentage of instances in which subject used empathic markers for the undergoer.

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

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. However, there are some unpredicted details in the 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.

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 revised as follows: undergoers who are topics are more likely to be referred to by some fronted expression, e.g., by being used as the subject of the first clause in the response.

Topic, in the nontechnical 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.[10])

We attempted to manipulate topicality experimentally by presenting a reversible-action panel in two conditions: first in isolation (''noncontext condition''), introduced verbally like the pictures in the ''brick'' and ''snowball'' series; second, as the final panel of a multipanel 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 the undergoer could be chosen as the grammatical subject of the sentence. Here, as in Study 2, the empathic focus would or could be on the undergoer, depending partly on how the context was interpreted. There were six situations, the first four roughly paired, and the last two patterned directly on the Inanimate/Animate materials used by Saffran et al. (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

The agents of the last two events are visible in the backgrounds of the illustrations. 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 noncontext 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

[10] 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.

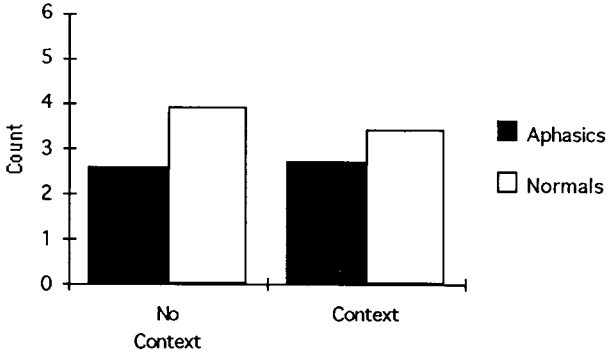


FIG. 8. Study 3, English Card Responses. Mean frequency of undergoer fronting in the context vs no context conditions (six opportunities).

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 Fig. 8. The context manipulation itself, however, had no significant effect on how often the undergoer was placed first by the aphasic subjects ($F(1) = .03$, $p = .873$ ns). 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 ($F(1) = 25.00$, $p = .0011$).

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, just as 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 the object are often necessary when the subject and the object are both referred to by a pronoun or a zero-pronoun, as in this example:

Dog saves boy
EX: *kodomo-wa doonatta?*
PAT: *tasukete iru*
∅∅ saving be
(he) is saving (him).

Here, the order of mention of the undergoer is not independently determinable, either in the Japanese patient's utterance or in its English equivalent ''He is saving him.'' Such sentences were counted, conservatively, as unmarked for undergoer.

Results

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: significantly more responses were empathically marked in the no-context condition than in the context condition (43 of 54 in no-context, 28 of 54 in context) ($F(1) = 25.00$, $p = .0011$). For aphasics, no significant differences in empathic marking resulted from context manipulation (52 of the 84 in no-context, 51 of 84 in context) ($F(1) = .03$, $p = .873$ ns).

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. The only significant effect of context manipulation was in the normals, who showed a significant decrease in the use of Undergoer Fronting in the context condition. There was a nonsignificant decrease in the normals' use of Passive. Aphasic subjects showed no significant effect of context for either of these syntactic devices. Figure 9 shows the relative use of passives in the no-context and context conditions; for normals, this was 25 in no-context and 20 in context out of 54 response opportunities in each condition. For aphasics, this was 23 in no-context and 31 in context, out of 84 response opportunities in each condition.

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

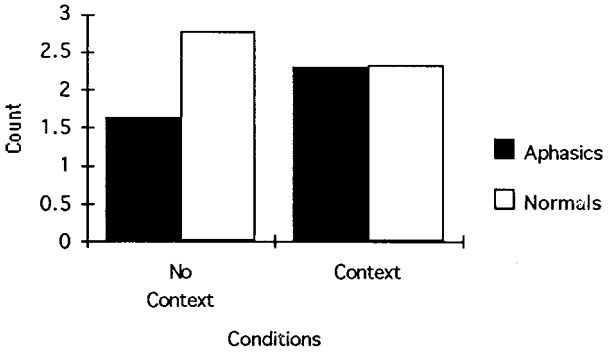


FIG. 9. Study 3, English, Passives, Context vs No Context. Mean frequency (per picture) with which aphasics and normals used passive constructions in context and no context conditions.

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 [χ^2 (1, $n = 64$) = 8.33, $p < .005$], showing their sensitivity to the question form.

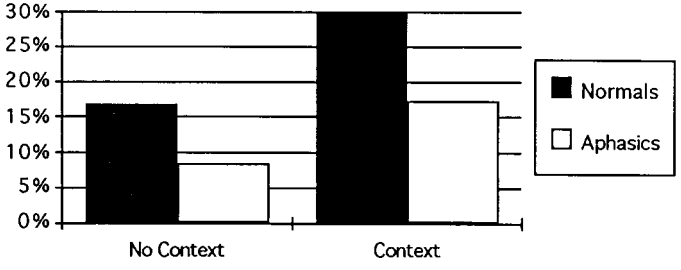


FIG. 10. Study 3, Japanese, Passives, Context vs No Context. Relative frequency with which aphasics and normals used passive constructions.

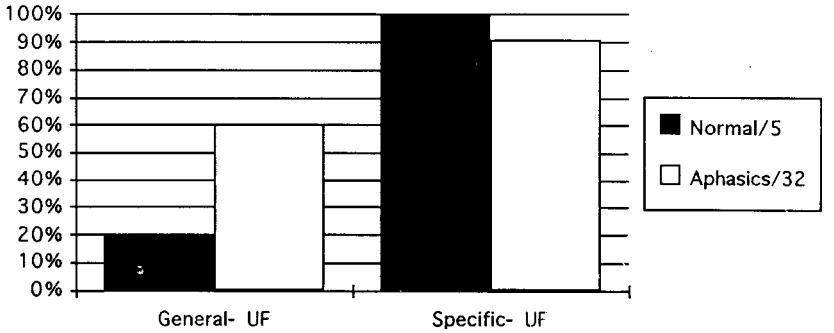


FIG. 11. Study 3, Japanese, Undergoer Fronting, context pictures. The effect of the question form on the frequency of undergoer fronting.

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.''

The effect of question form on undergoer focus: Comparison of studies 2 and 3. 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 were 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 six pictures.

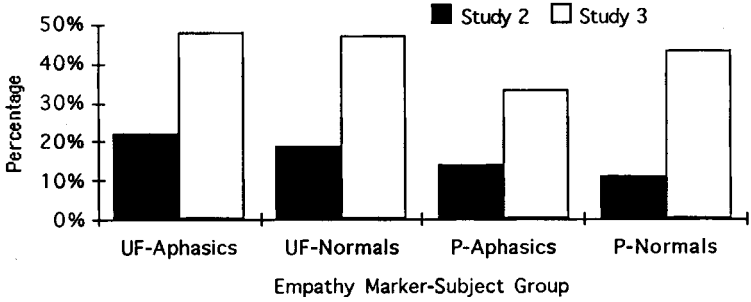


FIG. 12. The percentage of pictures for which aphasics and normals used either Undergoer fronting or Passive.

This difference is highly significant: for undergoer-fronting χ^2 (1, $n = 70$) $= 11.04$, $p < .005$. The figures and significance level for normals were similar, χ^2 (1, $n = 66$) $= 11.88$, $p < .005$, as shown in Fig. 12. For passive, aphasics' responses showed the same shift, χ^2 (1, $n = 47$) $= 7.68$, $p < .01$, as did normals, χ^2 (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.

GENERAL DISCUSSION

Empathy, Animacy, and Strategy

Does animacy or empathy drive the encoding choice? This question can only be addressed by examining the choices of sentence subject (or topic, for Japanese) that is 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,'' ''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 (52 out of 61 total responses to the three Race frames in question). This preference holds for each of these three pictures for both

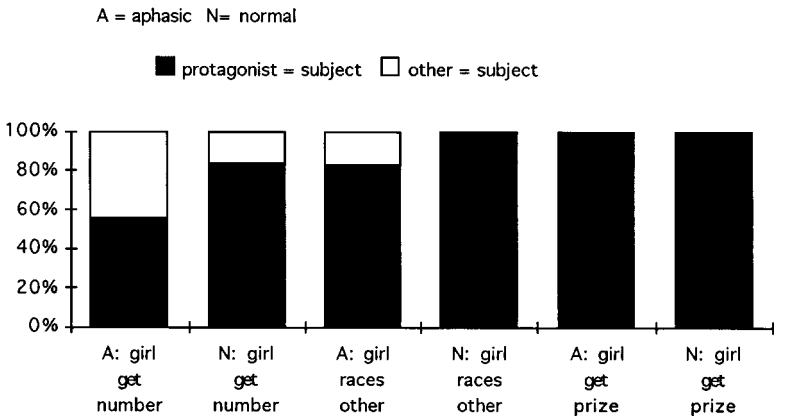


FIG. 13. Choice of protagonist (presumed empathic focus) as sentence subject in ''race'' story (Study 1), by aphasics and normals, Japanese and English combined.

normals and aphasics (see Fig. 13). This indicates that empathy, rather than animacy per se, is the operative factor.

However, since empathy is described as an emotional state of identification with another being, animacy should be a major factor—indeed, 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 inanimate–inanimate interactions? 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 they 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. So 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,

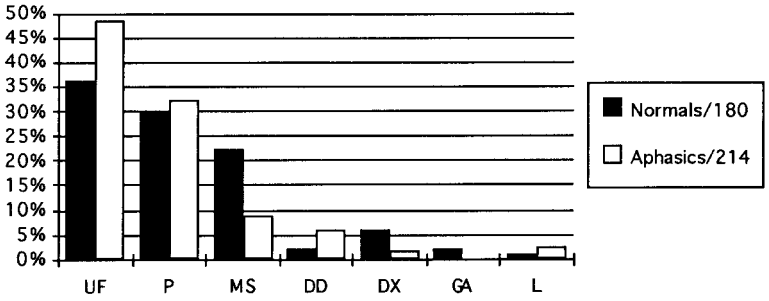


FIG. 14. English Empathy Marking, Studies 2 and 3 combined. Percentages based on the total number of undergoer empathic markers used by each group: 180 from the 9 normal respondents, 214 from the 14 aphasics. (Multiple tokens of the same type of empathy marker uttered by a given subject for the same picture were counted as one entry.)

and the response data indicate that subjects reacted to it as we 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.

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 Figs. 14 and 15. Undergoer fronting, passive, and mental status attribution were the most common forms of empathic marking for both groups of English speakers; undergoer fronting was the most common form for the Japanese respondents.

''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 *supplement or replace* normal automatic (''algorithmic''—Caramazza & Zurif, 1976) capacities for syntactic computation. Thus, Bever (1970) used the term ''word-order strategy'' to describe English-speaking

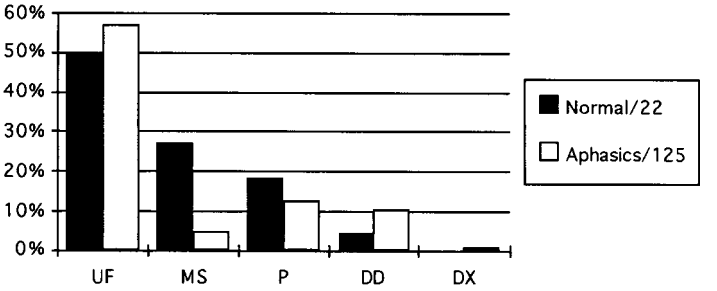


Fig. 15. Japanese Empathy Usage, Studies 2 and 3 combined. Percentages based on total number of undergoer empathic markers used by each group: 22 from the single normal respondent, 125 from the six aphasics. (Multiple tokens of the same type of empathy marker uttered by a given subject for the same picture counted as one entry.)

children's systematic errors in the comprehension of reversible passive sentences; Kolk, van Grunsven, and Keyser (1985) and Kolk, van Grunsven, and Keyser (1990) use 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 these strategies do not appear to be ''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, on the other hand, is not a strategy in the sense of the authors cited: Mrs. Kalmia's self-correction and others like it indicate that starting with the empathic focus is an automatic, affective, pre-syntactic reaction in both normals and aphasics. Apparently, this automatic reaction must sometimes be overcome in order to keep syntax simple when the undergoer is the empathic focus.

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 article: while starting with old information first is a strategy chosen by the speaker to maximize successful identification of the referent by the hearer, starting with the empathic focus appears to be a matter of impulse.

On the Nature of Canonical Form

Now let us return to the issue of canonical form, raised in the introduction. First, the Japanese data confirm the importance of canonical word order in production. After all, to show empathy in Japanese, one can simply bring the undergoer plus its case marker to the front of the sentence. There is no need to change either the case marking of the noun or the voice of the verb. Nevertheless, Japanese patients made case-marking errors (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 problematic; 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?

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 ditransitive) actions, in which the simple (i.e., single-clause) active-voice clause is contrasted with the matching passive-voice clause.[11] Therefore, experimental work has generally confounded the semantic ''subject = agent'' property and the morphosyntactic ''verb = active voice'' property. 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.'' On the other hand, perhaps it is the syntax–semantics mapping or the deeper syntactic structure that is the problem, as Kegl, working in the Government/Binding framework, hypothesizes (Kegl, 1995).

The present studies suggest, tentatively, that verb = active voice may be the key property of canonical form, rather than agent = subject. Both the

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

TABLE 4
Verb Phrase Types

Verb Phrase Type	Controls (10)		Patients (9)	
	n	Percentage	*n*	Percentage
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
''Be'': passive or 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 responses	162		85	

fluent and the nonfluent aphasic patients made considerable use of a few intransitive undergoer-subject active-voice verbs, as indicated in Table 4.

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.[12]

However, these findings must be interpreted with caution. The argument runs as follows. First, agrammatic Broca's aphasics who are able to give

TABLE 5
Undergoer Subject Responses by Normals and Broca's

Verb phrase type	Controls (10)		Broca's (4)	
	n	Percentage	*n*	Percentage
Get- and be-passive	24	71	7	37
Intrans-undergoer = subject	10	29	12	63
Total undergoer = subject responses	34		19	

[12] Overall, use of passive (P/GP) by all of the patient groups combined was not different from normals: $\chi^2(1, n = 460) = 1.605$, $p > .10$. Use of P vs GP also was not significant: $\chi^2(1, n = 123) = 2.80$, $p > .05$.

narratives tend also 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,[13] 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 modeled by the examiner 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 aphasic subjects. Such a test will have to be left as work for the future.

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 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, Saffran, & Marin, 1980; Saffran et al., 1980) suggested that agrammatic patients have trouble with the mapping of structures onto semantic representations, and so they have to fall back on a strategy of treating an animate noun as agent. Bates, Friederici, Wulfeck,

[13] ''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'').

and Juarez (1988), Fujita, Takahashi, and Toyoshima (1977), Fujita, Miyake, Nakanishi, and Imamura (1982), Fujita and Miyake (1985), and many others have shown that both fluent and nonfluent aphasic patients rely on canonical word order in both comprehension and production; the patients 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 the 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 generally been limited to sentences in isolation.

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 nonfluent 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/or on the expectation that the mapping of noun phrases onto semantics will follow the pattern of the verb's most frequent semantic frame.

Toward a Production Model

What sort of psycholinguistic model is suggested by these production results? 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 list of the ways in which that verb can assign semantic roles to its syntactic arguments. These are referred to as its valence, subcategorization, or 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, consider the passives to be rapidly constructed, instead).

be-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 that could then guide the placement of the undergoer hat into the subject slot. How is this to be accomplished?

It would be reasonable to assume that all frames of a verb are initially activated when the verb's lemma is activated, 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; the principal exceptions to this would be verbs of mental reaction such as ''disgust,'' ''anger,'' ''please,'' ''thrill''—see F. Ferreira (1994) and V. S. Ferreira (1996).[14]

In production, one frame would become the most highly activated; this should be the one chosen by the interaction of the speaker's impulse and his/her judgment of the hearer's need, as discussed at the beginning of this article. Suppose that this works in our example by a preliminary emotional activation of hat as focus of concern (as in Levelt's micro-planner). The heightened activation level would tend to make it the first item mentioned (cf. Bock & Warren, 1985). This, added to the propositional information hat = undergoer (the entity most affected), should then 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, for most verbs, 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, and Marin study.

[14] The past participles of many of these verbs share characteristics of adjectives—for example, they can be modified by ''very'' (e.g., ''They were very threatened.'' cf. *''They were very robbed''). A proper psycholinguistic model must reflect this.

Thus reversal 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'').

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. Furthermore, errors would be detected by the hearer only when the hearer is in a position to know what should have been conveyed.

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 syntactic 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 more common *get*-passive; what they retain is the active-voice morphology and the pragmatics-driven choice of which entity should be mentioned first. Clinical experiments make clear the extent of these losses; naturalistic elicitations bring out the 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 is compatible with the cited experimental work on speech production in normals, and it handles two problems that were outstanding in the aphasia 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 the purely syntactic accounts of these performance deficits or as superseding them will require much further theoretical and empirical elaboration.

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

Subject Information

English-Speaking Patients in Order of Increasing Severity

Code	Sex	Age	Months post	Handed	Diagnosis	BDAE sev	BDAE aud	Phrase L or WAB	Conf Nam/114	Etiology	Localization in LH	Education	Study 1	Study 2
Wolf	M	62	44	R	Anomic	1.5	0.90	6	41	cva/aneury	F&T+deep	MD	yes	yes
Reindeer	M	49	58	R	Broca's	1.5	0.70	3	58	cva	posterior F+	HS+2 yr col	no	yes
Yak	M	49	64	R	Broca's	2	WAB 8	WAB 4	WAB 5/10	subarac hem	MCA distal	BA anthro	no	yes
Kalmia	F	68	61	R	Broca's	2.5	0.80	5	114	cva-emb	F,T,P, & deep	HS+2 yr col	yes	yes
Zebra	M	56	31	R	Broca's	2.5	0.85	3	92	cva	cen P	HS+	yes	yes
Ivy	F	70	116	R	Broca's	2.5	0.87	2	102	cva-emb	posterior F	MS in ED	no	yes
Ferret	M	50	55	R	anomic	3	0.85	7	113	cva	subcort	BA++, enginr	no	yes
Camel	M	68	77	R	anomic	3	0.87	7	111	cva-thr/emb	posterior F+	BA business	no	yes
Moose	M	44	85	R	mixed nonfl.	3	0.65	6	86	aneurysm	xx	JD, PhD	yes	yes
Horse	M	72	41	R	Wernicke's	3	WAB 8	WAB 9	WAB 8.5/10	cva-emb	T and P	MS accountng	yes	yes
Wallaby	M	72	23	R	anomic	3.5	0.83	7	est 105	cva-thr/emb	MCA dist	MA++	yes	yes
Daffodil	F	41	16 yr	R	anomic	3.5	0.90	7	110	cva-emb	CVA	MA Irn.dis.	yes	yes
Falcon	M	64	46	R	anomic	4	0.90	7	101	cva	F & P	HS	yes	yes
Hyrax	M	68	4	R	Wernicke's	4	1.00	7	114	cva	P	MA math+theo	yes	*
Kudu	M	65	69	R	Broca's	xx	xx	xx	xx	cva	MCA distal	BA+	no	*

English-Speaking Patients in Order of Increasing Severity

Code	Notes
Wolf	
Reindeer	
Yak	
Kalmia	Yiddish 1st, English at 5
Zebra	
Ivy	stereotypy ‘‘right about now’’; WAB conduction
Ferret	some jargon
Camel	
Moose	several other languages
Horse	
Wallaby	acquired stutter
Daffodil	
Falcon	
Hyrax	card data not collected
Kudu	*card arrang. only/almost no oral responses apparently very good comprehension

English-Speaking Control Subjects

Code name	Sex	Age	Education	Occupation	Study 1	Study 2	Notes
Badger	M	58	BSEE+	manager	Y	Y	
Bluebell	F	71	BA English	housewife	Y	Y	
Cougar	M	77	HS+1 yr college	sales	Y	Y	
Lilac	F	64	MA	teacher	Y	N	
Nasturtium	F	69	HS graduate	secretary	Y	Y	
Olive	F	62	HS graduate	store clerk	Y	Y	
Petunia	F	71	HS graduate	secretary	Y	Y	
Mrs. Sorrel	F	74	MA English	H.S. Latin teacher	Y	Y	possible perceptual deficits
Mr. Sorrel	M	77	PhD chemistry	industry R&D	Y	Y	
Wisteria	F	51	BA	housewife	Y	Y	

Note. Controls were found through a senior citizen volunteer organization.

Japanese-Speaking Patients

Code	Age	Handed	Sex	Diagnosis	Severity	Education/occupation	Study 1	Study 2
Asari	43	R	M	Broca’s	Moderate	12 yr/office worker	N	Y
Hamaguri	42	R	M	mixed nonfluent	Moderate	12 yr/shop owner	Y	Y
Kamoshika	37	R	M	mixed nonfluent	Moderate	15 yr/camera man	Y	Y
Koorogi	50	R	M	Wernicke’s	Mild	12 yr/construction worker	N	Y
Neko	16	R	M	mixed nonfluent	Moderate	9 yr/student	Y	N
Okami	23	R	M	Broca’s	Moderate	9 yr/construction worker	Y	N
Oshidori	47	R	M	Wernicke’s	Mild	16 yr/office manager	Y	N
Tanuki	35	R	M	mixed nonfluent	Moderate	12 yr/office worker	N	Y
Tampopo	33	R	F	mixed nonfluent	Moderate	12 yr/salesclerk	Y	N
Yagi	37	R	M	Broca’s	Moderate	12 yr/office worker	Y	N

Japanese-Speaking Control Subjects

Code name	Sex	Age	Education/occupation	Study 1	Study 2
Kosumosu	F	44	18 yr/speech therapist	Y	N
Kuchinashi	F	38	12 yr/housewife	Y	N
Murasaki	F	55	12 yr/housewife	Y	N
Ookusa	F	48	18 yr/speech therapist	N	Y
Semi	M	55	12 yr/policeman	Y	N

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