

STARTING POINTS

BRIAN MACWHINNEY
University of Denver

This paper indicates how sentence processing depends upon the active construction of a PERSPECTIVE, which is the way a speaker or a listener becomes actively involved in a sentence. For this reason, the perspective is usually the starting point of the sentence. A number of linguistic and psycholinguistic studies are reviewed in the light of this approach to sentence processing.

The speaker uses the first element in the English sentence as a starting point for the organization of the sentence as a whole. Similarly, the listener uses the first element in a sentence as a starting point in comprehension. Both the speaker and the listener seem to use special techniques for attaching the body of the sentence to the starting point. Given the sentence *Mary ate the apple*, it seems that listeners take *Mary* as an initial node in processing, and then attach *ate the apple* to this node. Similarly, the speaker takes *Mary* as what he wants to talk about and then says something about *Mary*.

Recently, both linguists and psychologists have become increasingly interested in where sentences come from. One component of this over-all problem is the question: 'Where do starting points come from?' This paper explores one possible approach to answering this question, which I will call the PERSPECTIVE HYPOTHESIS, hereafter PH. According to this, starting points serve as bases for the ACTIVE CONSTRUCTION OF AN ACTIVE PERSPECTIVE. In §1, I outline the four basic components of the PH. In §2, the PH is contrasted with other functionalist theories. In §§3-8, I deal with various experimental approaches to the role of the starting point: ratings, elicited production, problem-solving, verification, comprehension, and recall. The results are interpreted in the light of the PH. In §9, the results are summarized.

THE PERSPECTIVE HYPOTHESIS

1. The PH holds that both the choice of a starting point in production and the use of a starting point in comprehension are determined by processes involved in the active construction of a perspective. It is hypothesized that the speaker-listener actively involves himself with a sentence by 'getting inside it'. Speakers tend to choose the perspective which is most compatible with the perspective which they assume in their own motoric, causal, social, and positional interactions with the world. This means that, given a choice between two starting points, speakers and listeners prefer the starting point closest to the one they assume or wish to assume in their own interactions with the world. Thus Clark & Chase 1972 show that speakers prefer starting points that are 'above' to starting points that are 'below'. This corresponds to a preference for being on top in motoric as well as social interactions. Or, to take another example, Johnson-Laird 1968b shows that subjects prefer large starting points to small ones. Again, this preference seems to correspond to estimations of self-importance.

The full PH can be analysed into four mutually dependent sub-components, each of which will be discussed separately below.

1.1. MEANING AS IMITATIVE CONSTRUCTION. Piaget 1952 and Piaget & Inhelder 1971 view representation as an internalization of active sensori-motor imitation. The PH attempts to apply Piaget's understanding of imitation, representation, and role-taking to the problem of the acquisition of knowledge from language. Given a sentence like *Mary ate the apple*, the listener is seen as taking the perspective of *Mary* and forming a mental reconstruction of the activity of eating an apple. This reconstruction is imitative, and serves to convert public signs (words, drawings) into the individual's own private symbol system. Although the bulk of this imitation is covert, Sokolov 1972 reports specific overt hand and tongue movements during mental arithmetic and translation tasks. Furthermore, in a study to be discussed below, Ertel & Bloemer 1975 show how negative sentences are best recalled if they are learned while pulling blocks apart rather than putting them together.

1.2. PERSPECTIVE AND IDENTIFICATION. According to Piaget, the child constructs the sensori-motor world from his own perspective. The one-year old child, at sensori-motor Stage V, perceives how his actions lead to changes in the world, but he understands these changes only from his own perspective. Eventually, he learns to comprehend changes from perspectives other than his own, by

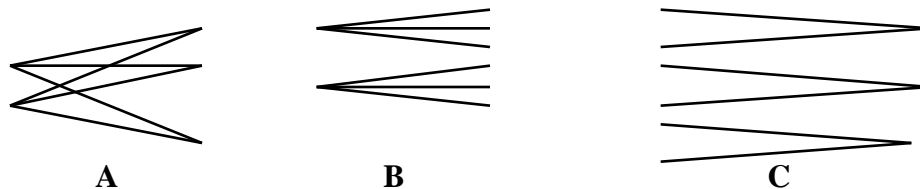
identifying his own sensori-motor causal perspective with alien ones. In Gestalt terms, this is 'indwelling' (Einfühlung). The PH holds that speakers and hearers identify with the starting point of a sentence, and construct the sentence from this perspective.

This view of starting points as loci for identification helps elucidate several apparent paradoxes in syntax. Thus, different starting points induce different perspectives:

- (1) Many arrows didn't hit the target.
- (2) The target wasn't hit by many arrows.

The perspective and starting point in 1 is *many arrows*. From the perspective of this collection of arrows, the predicate *didn't hit the target* locates the collection off *the target*; informants often report an image of many arrows strewn about under a target. In 2, the perspective and starting point is the target. From this perspective, the predicate *wasn't hit by many arrows* suggests that few arrows are in the target, which is precisely how most informants understand this sentence. The point is that 1 and 2 are not equivalent in truth value; and the claim is that this asymmetry is related to the process of identification.

A similar situation in sentences 3-4 is illustrated in Figure 1; this is constructed so that languages are on the left of each of the three diagrams (A, B, and C), and speakers are on the right.



Whereas both sentences can mean A, only 3 can mean B, and only 4 can mean C:

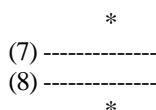
- (3) Two languages are spoken by four people.
- (4) Four people speak two languages.

Not all examples involve mapping relations; e.g.,

- (5) Chimps speak like the deaf.
- (6) The deaf speak like chimps.

Here the predicate *speak like the deaf* in 5 states something laudatory from the perspective of *chimps*; but the predicate *speak like chimps* in 6 states something derogatory from the perspective of the deaf.

1.3. DETERMINATION OF A STARTING POINT. Identification is the fundamental determinant of starting-point choice. However, the assignment of identification to a given element can be determined by perceptual, relational, or linguistic factors. As an illustration of this multiple determination, consider these stimuli used by Clark & Chase:



When subjects were asked to describe 7, sentence 9 was given 89% of the time, and 10 was given 11% of the time; but when they were asked to describe 8, sentence 11 was given only 69% of the time, and 12 was given 31% of the time:

- (9) The star is above the line.
- (10) The line is below the star.
- (11) The star is below the line.
- (12) The line is above the star.

The preference for the star as a starting point in 9 and 11 is due to the first, or PERCEPTUAL, type of determination. In general, figures (e.g. stars) are better starting points than grounds (lines). It may be that humans perceive themselves as figures with the external world as ground.

On the other hand, the decreased preference for *star* as a starting point in 11, as compared to 9, is caused by the second, or RELATIONAL, type of determination. Speakers prefer to identify with objects in the unmarked relation 'above' rather than in the marked relation 'below'. The drop in the percentage of

sentences beginning with *star*, from 89% in 9 to 69% in 11, appears to result from a conflict: identification with the *star* as a figure vs. preference for the element in the relation above as a starting point.

The third form of determination is LINGUISTIC. If subjects in the Clark & Chase experiment had been asked *Where is the star?* with stimulus 7, they would undoubtedly use 9 rather than 10. This type of determination is fairly categorical. In other words, subjects never answer the question *Where is the star ?* by saying *The line is below the star*.

MacWhinney 1975 provides another example of the conflict between relational and perceptual determination. One task in this study was for children to describe a picture of a kitty giving a flower to a bunny. This picture was described by one three-year-old with the sentence *A bunny a kitty's giving a flower to a bunny*. Here the child first took the perspective of the bunny, and then abandoned it for that of the kitty. At Time 1, perceptual characteristics of the drawing of the bunny seemed to determine its choice as a perspective. At Time 2, however, the child found that the unmarked relationship occurring in the picture was 'giving'. The relation of 'getting' is more marked. Thus the perceptually determined starting point *bunny* was not the same as the relationally determined starting point *kitty*. Although the bunny may have caught the child's eye, he soon realized that the kitty had the more active perspective; and this forced a shift in perspective realized as a retraced false start. There was a significant tendency in this study for these shifts to go in the direction of decreased relational markedness. Additionally, when describing a sequence of pictures like 'A kitty giving a flower to the bunny' followed by 'A kitty giving a car to the bunny', there was a significant tendency for perspective to shift in the unmarked direction. In other words, children would often say 13 followed by 14, but they would rarely say 15 followed by 16:

- (13) The bunny is getting a flower from the kitty.
- (14) The kitty is giving the bunny a car.
- (15) The kitty is giving a flower to the bunny.
- (16) The bunny is getting a car from the kitty.

Carpenter & Just 1972 indicate how linguistic starting points can influence perceptual ones. Subjects were shown a field of fourteen dots, of which two were red and twelve were black. Alternatively, two were black and twelve were red. When asked to verify sentences like 17, subjects tended to fixate first on the smaller subset; but when verifying sentences like 18, they tended to fixate initially on the larger subset:

- (17) The minority of the dots are red (black).
- (18) The majority of the dots are red (black).

This study shows how the syntax of picture processing can be influenced by that of the linguistic task.

The starting point can serve four functions. These are to designate (a) the attentional focus, (b) the perspective, (c) the agent, and (d) the given. The first function is invariant, since the starting point is always the first element to attract the listener's attention. The speaker may use this fact to draw attention to some element that is not actually the perspective:

- (19) Up jumped the rabbit.
- (20) *Den Peter nimmt Hans mitt*

For the speaker, these starting points are not perspectives, but they are initial attentional foci. The listener, on the other hand, initially treats all starting points as possible perspectives. Although he quickly rejects up and den Peter as perspectives, he does process the speaker's suggestion that these are important and interesting pieces of information.

The other three functions of the starting point are not invariant. A given starting point MUST fulfill the first function; but it CAN fulfill all, some, or none of the other three. Thus in 21-22, the starting point serves all functions but the third:

- (21) The apple was eaten by Mary.
- (22) *Peter wird von Hans mitgenommen.*

The listener initially hypothesizes that the starting points here serve all four functions. However, he later realizes that they provide him with an initial attentional focus, a perspective, and a given—but no agent. This dissociation of the second and third functions can be viewed as a dissociation of the basic sensori-motor schema for causation. In 21, the listener may take the perspective of *the apple*; but he also has to view *Mary* as agent. This separation of perspective and agency will be called a COMPLEX PERSPECTIVE.

The fourth function of the starting point can also be dissociated from the other three; Travnicek 1962 suggests that the starting point thus serves as a linkage to thought. In 21-22, prior discourse may have established *the apple* and *Peter* givers; but in 19-20 the givens are probably *the rabbit* and *Hans*, which

are starting points. It is also possible to dissociate the given from both the attentional focus and the perspective; thus, in the sentence *In two seconds, a bird will be chased I by a cat on the lawn* (with rising intonation on *bird* and *cat*, and falling intonation on *lawn*), the attentional focus is *in two seconds*, the perspective is *a bird*, the agent is *a cat*, and the only given is the *lawn*. Admittedly, such extreme dissociations are rare.

COMPARISONS WITH OTHER FUNCTIONAL APPROACHES

2. The PH is offered as a psycholinguistic articulation of the functional sentence perspective (FSP) developed by the Prague School. However, it differs in a few important ways from FSP and theories deriving from FSP; and this section examines these areas of contrast. The writings of the Prague School on FSP are numerous; but this discussion will focus on Mathesius 1939, Benes 1959, Travnicek 1962, and Firbas 1964, 1966, which have attempted to say where starting points come from'

Mathesius (171) identifies the theme as 'that which is known or at least obvious in a given situation and from which the speaker proceeds'. Travnicek (166) criticized Mathesius's equation of thematicity with simple givenness, and notes that some sentences begin with 'new' material. He suggests that the starting point of a sentence be viewed as 'the sentence element which links up directly with the object of thought, proceeds from it, and opens the sentence thereby' (translations from Firbas 1964).

Building on a suggestion from Benes, Firbas 1964 suggests that Travnicek's notion might characterize the starting point (basis), but not the theme: although the theme is usually the starting point, it can be placed non-initially in emotive sentences. To characterize the theme, Firbas (1964:270) introduces the notion of communicative dynamism, defined as the degree to which an element 'pushes the communication forward'. In the unmarked case, the starting point is the element lowest in communicative dynamism. In the marked or emotive case, the starting point may have a higher level of communicative dynamism.

Although Firbas's bidimensional approach is interesting, how he distinguishes his 'communicative dynamism' from Travnicek's 'linkage to thought' is not clear. Both constructs seem similar to what the PH calls the fourth function of the start) point. Firbas and Travnicek both correctly note that the starting point is not always given; however, Travnicek's 'linkage' should not be equated with the first function, i.e. attentional focusing. Linkage is more related to givenness than to focusing. The underlying problem is that the constructs of Travnicek and Firbas overlap a great deal, and fail to treat phenomena like perspective, agency, and focusing.

Halliday 1967 proposes a whole array of semantic options to account for the structure of clauses. In his account, each clause has only one theme, while each tone group has a piece of information focused for its newness. Although themes are often 'given', they may also be 'new', as in *MARY ate the apple* (in reply to the question, *Who ate the apple?*) Moreover, 'given' elements such as pronouns and definite noun phrases are often non-thematic (Firbas 1966).

Halliday views information focus as a 'kind of emphasis' which 'reflects the speaker's decision as to where the main burden of the message lies' (204). In the unmarked case, starting points do not receive information focus, and hence are not stressed intonationally. It is clear that Halliday's information focus is something quite different from attentional focus in the PH, which views serial ordering and intonational stress as separate focusing devices. As has been argued by Travnicek and by Clark & Haviland 1976, elements that occur early in a sentence serve to connect the whole sentence to memory structure. This is the fourth function of the starting point, which involves establishing a cognitive given. Halliday, however, attempts to identify information focus with both intonational stress and the given/new contrast. The problem is that these two dimensions are often orthogonal: stress within the tone group can be assigned to given items (pronouns, deictics etc.) as well as to new items. The PH suggests a sharp distinction between attentional focusing (which involves serial ordering), contrastive focusing (which involves intonational stress), and givenness (which involves deixis).

Halliday defines the theme as 'the point of departure for the clause as a message', and further notes that thematicity is related to mood; thus, in the interrogative, the question word is the theme of the clause. However, it is not clear that this saliency of the starting point is as much thematic as attentional. The PH suggests that the listener attempts to process the starting point as the perspective. In part, this accounts for its attentional saliency. Modality elements placed as starting points also receive attentional focusing. When Halliday treats passive patients as themes, his analysis parallels that of the PH.

The functionalist analyses of Benes, Firbas, Halliday, Mathesius, and Travnicek all differ from the PH in two fundamental ways. First, the PH attempts to be somewhat more specific in separating out the four functions of serial initialization (attentional focus, perspective, agent, and given) from the functions of intonational stress (contrastive focus, second instance etc.) and of lexical markings (deixis, anaphora etc.) Second, none of the other functionalist analyses views sentence processing as involving active construction by means of a perspective. The PH holds that one function of the starting point is the communication of a perspective.

A generally similar analysis has been reached independently by Ertel 1974a,b, in an attempt to provide a Gestalt perceptual account of the category 'subject'. He identifies the subject as the anchoring-point ('Verankerungspunkt') in the construction of the sentence, and relates this anchoring of perspective to the operation of ego-perspective ('Ich-Perspektiv') within the sentence. The grammatical subject is seen as the element closest to ego.

There are some minor differences between Ertel's views and the PH; e.g., the PH attempts to account for the choice of a starting point, while Ertel does not. Ertel is interested in clarifying the notion 'subject', while the PH considers the subject to be a derivative category. Finally, Ertel has applied the concept of 'ego-perspective' to problem-solving within cognitive spaces organized around ego; in this regard, his 'ego-perspective' resembles Kuno's (1975) 'empathy'.

This section has focused on contrasts between the PH and other functionalist theories; a still sharper contrast can be drawn with various non-functionalist theories. In the five sections which follow, the PH is applied to a wide range of psycholinguistic findings. The reader is invited to consider whether non-functionalist theories can provide satisfactory accounts of these inherently functional phenomena.

RATINGS OF THE THEME

3.1. THE PERSPECTIVE ACCOUNT. The PH holds that, when asked to rate starting points, subjects should judge them as active and potent. Whenever a starting point is the perspective and another element is the agent, a complex perspective results. Starting points in complex perspectives should be rated as somewhat less active and potent.

3.2. THE STUDIES. TWO studies have examined subjects' ratings of the semantics of the perspective. Johnson 1967 asked subjects to rate nonsense nouns in active and passive transitive sentences along 15 dimensions of Osgood's semantic differential. The over-all ordering along 11 scales of animateness and 4 scales of evaluation was Active Agent > Passive Agent > Passive Patient > Active Patient, with the Active Agent judged the most animate and most positively evaluated. Note that both the second and the third functions of the starting point (see §1 above) contribute to these results. When an element is a perspective and an agent, it is maximally potent. When an element is an agent but not a perspective, it is somewhat less potent. When an element is a perspective but not an agent, it is less potent still. The least potent nouns in this study were neither perspectives nor agents.

In a less direct rating study, Johnson-Laird 1968a asked subjects to draw pictures of sentences such as *Red follows blue* and *Blue is followed by red*. Subjects were told that these pictures would later be given to 'somebody else' who would be asked to match them to the corresponding sentences. Subjects tended to make colors larger when they were starting points than when they were not.

3.3. ALTERNATIVE ACCOUNTS. Non-semantic categories such as 'subject' are not useful in accounting for these rating results. Rather, these results must be explained by semantic categories. Moreover, it is not enough to say that themes are 'given' or 'topical': thematicity must be related in some meaningful fashion to preferences for animateness, potency, and largeness. Nor does the category 'agent' used alone predict Johnson's results, since patients were judged as more animate than agents in the passive.

PERSPECTIVE CHOICE IN ELICITED PRODUCTION


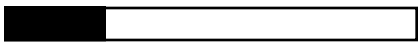
4.1. COMPARATIVES. Comparative scales such as *long-short*, *good-bad*, or *bright-dark* seem to fall into two groups. In the first group, one direction is clearly unmarked: in pairs such as *long-short*, *more-less*, *probable-improbable*, the first member is basic. For these scales, subjects seem to make only one underlying measurement: length, quantity, or probability. The element which is most potent and active along this scale is the one with the most of the quantity measured, and is the element chosen as the starting point (Clark 1974).

In the second group of scales, e.g. *young-old*, *bright-dark*, *good-bad*, or *pleasant-unpleasant*, subjects make judgments in both directions equally well. They can measure 'goodness' as well as "badness"—although, as Boucher & Osgood 1969 have noted, they prefer to measure 'goodness'. For these scales, starting-point choice in a comparison is determined by two factors, potency and goodness. Again, these two factors in starting-point choice are in accord with the PH.

This analysis also receives support from several psychophysical studies (Audrey & Wallis 1964; Ellis 1972; Marks 1972; Shipley, Coffin & Hadsell 1945; Wallis & Audley 1964). These show that, for the first group of scales, subjects are quicker to make comparisons along the underlying dimension (i.e. length) than a secondary reversed perspective (i.e. shortness). The more of the underlying dimension the stimuli possess, the easier the judgment becomes. In the second group, however, the results go both ways thus the darker two objects are, the easier is the answer to *Which is darker?*; and the brighter they are, the easier is the answer to *Which is brighter?* Clark 1969 and Marks 1972 attribute this to congruence between linguistic marking and perceptual coding. The PH would note that this congruence is not all-or-none, as Clark suggests; rather, the more a dimension is activated, the more vivid it becomes, and the quicker a perspective is taken.

4.2. TRANSITIVES. Clark 1965 asked subjects to put nouns into active frames (*The _____ed this _____*). The percentage of animate nouns given for each position conformed to the rating hierarchy found by Johnson. All the remarks made in the discussion of Johnson's rating results also apply to these elicitation results.

Johnson-Laird 1968b gave subjects sentences like 23-26 and stimuli pairs like 27-28, in which the shaded areas represent blue:

- (23) There is a blue area that precedes a red area.
 - (24) There is a red area that a blue area precedes.
 - (25) There is a red area that is preceded by a blue area.
 - (26) There is a blue area that a red area is preceded by.
- (27) 
- (28) 

When asked to choose sentences that could be used by 'someone else' to pick out 28 rather than 27, subjects chose sentences in this order of preference: 25 > 24 > 23 > 26. First, they preferred sentences with the large area of 28 as the starting point of the main clause. Second, they preferred sentences in which the perspective of the main clause was also the perspective of the subordinate clause.

Four other studies have attempted, by manipulating aspects of the linguistic and perceptual context, to influence the subject's choice of a starting point. Turner & Rommetveit 1967 attempts both manipulations. When a transparency was slowly dragged across a screen, the child could be shown, for example, a snake and then a turtle. This 'controlled visual scanning' could induce the child to produce a passive like *A snake is being followed by a turtle*, but only when a model slide together with a passive model sentence was presented first. On the other hand, use of a series of questions with the patient as the starting point was more effective than controlled visual scanning in eliciting passives.

Turner & Rommetveit's success in eliciting passives through manipulation of the linguistic context, and failure to do so through manipulation of the perceptual context, is duplicated by other research in this area. Osgood 1971 was unable to elicit passives when he asked adult subjects to 'simply describe' perceptual arrays, even when the patient was 'given' in previous arrays. On the other hand, Carroll 1958 found that high-school students could be induced to use passives, if the eliciting questions focused the patient. Tannenbaum & Williams 1968 were able to decrease latency to production of the passive by presenting six-sentence 'preambles' which modeled passives; the starting point of these modeled passives was identical to the starting point of the target passive. The effect of linguistic context demonstrated here is not that of the contextual 'givenness' of the starting point, but of the formation of a set ('Einstellung') by modeling of passives.

Together, these four studies suggest that passivization cannot be triggered simply by the fact that a non-agent element is perceptually 'given'. Passivization seems to require linguistic contextual effects. However, it is fairly resistant to perceptual or relational determination (see §1). These findings agree with the PH, which holds that the normal human perspective is active rather than passive. Developmental studies of the acquisition of the passive (Bever 1970) indicate that, between the ages of three and six, the starting

point is quite rigidly interpreted as both the perspective and the agent. Only at the end of this period, at the time of the emergence of what Piaget calls 'concrete operations', does the child show control of the passive. This control seems to be operational in that it relates choice of the starting point not only to the situation but also to the discourse. Moreover, it allows the child to dissociate the perspective and the agent.

4.3. EVENT CHAINS. Osgood has shown that subjects tend to code causal chains by taking the successive perspectives of successive moving elements. He showed subjects a series of collisions in which a black ball hit a blue ball which then went on to hit an orange ball. In subjects' descriptions, the black ball was mentioned first 57% of the time; the blue ball was mentioned second 68% of the time; and the orange ball was mentioned third 61% of the time. Thus, order of mention tends to reflect the succession of perspectives for active balls.

4.4. ALTERNATIVE ACCOUNTS. The results discussed in this section are fairly diverse; yet they all point to the role of perspective-taking in sentence processing. Givenness, communicative dynamism, or linkage to the object of thought cannot explain these results. There is nothing conversationally given about the natural dimension in the studies of comparatives, or the colors in Johnson-Laird 1968b. The studies of passive elicitation provide evidence in support of the third and fourth components of the PH; they show that the passive perspective is complex, and can best be induced by linguistic determination.

PERSPECTIVE USE IN PROBLEM-SOLVING

5.1. PLACEMENT TASKS. Some of the most interesting elucidations of the PH have been made by Huttenlocher and her colleagues. Huttenlocher & Strauss 1968 found that first-graders and third-graders were quicker and more accurate at placing a block on top of (or under) a stationary block when the movable block was the starting point in the sentence of the instructions — e.g.,... where the green block was movable and the subject heard *The green block is under the red block*. Huttenlocher, Eisenberg & Strauss 1968 found that fourth-graders were quicker to make a truck push or pull another truck when the movable truck was the starting point in active sentences, e.g. *the red truck in The red truck pulls the green truck*. In passive sentences, however, children were quicker to place the movable truck when it was not the starting point. Since the task in both cases involves making an object move, it is not surprising to find that children make the agent move. Given *The red truck pushes the green truck*, the child is frustrated only when he notes that the red truck is nailed down. Given *The red truck is pushed by the green truck*, the child is frustrated only when he finds that the green truck is nailed down. Huttenlocher, Eisenberg & Strauss claim that subjects solve this by imagining that the fixed truck is actually mobile. Such reports underline the active nature of the constructive imitation involved in sentence processing.

This study is important because it separates out the effects of the second and third functions of the starting point; the placement results should be attributed more to the third function (agency) than the second (perspective). Placement was quickest when the starting point was both agent and perspective. However, when these functions were separated, latencies were shorter when the starting point was the agent, rather than the perspective. These results are not surprising, given the highly agential nature of the movement task. In simple verification tasks, no such strong agent effect has been noted (cf. Olson & Filby 1972). However, the important point is that neither agency nor perspective, taken alone, accounts for the data.

A further study, Huttenlocher & Weiner 1971, investigates the mechanics of operation with a complex perspective. The authors suggest that the difficulties which subjects faced in processing sentences with nailed-down actors are reflected in difficulties which they had in replicating arrays with two movable objects. If a subject attempted to place a couple of trucks onto an empty board to *represent The green truck is pulling the red truck*, a complex perspective might be precipitated. Subjects tended to move the first-mentioned truck first. Up to this point, the starting point was treated as both agent and perspective. With this first truck as the perspective, they then had to pick up a second truck. The very act of manipulating a second truck appeared to conflict with the activities that had been planned with the first truck as perspective. From the perspective of the first truck, the planned activity was to be pulling. However, it would be a mistake to make the non-agential second truck do the pulling. Huttenlocher & Weiner report: 'one gains the impression from watching subjects in Experiment IV that they picked up the second truck, and then were surprised that they did not know where it went.' It seems that manipulation of an object induced the subject to take the perspective of that object. However, this is not the same as saying that taking the perspective of an object induced mental 'picking up' of that object (compare Clark 1969).

5.2. DEDUCTIVE REASONING. Clark 1969 contains the most thorough examination of three-term syllogistic problems; e.g., (29) A is better than B. B is better than C. Which is best? Table I shows the 32 permutations of this syllogism which Clark studied. In general, he found evidence for the principles of markedness and congruence which are also recognized by the PH.

	FORM OF PROBLEM	FORM OF QUESTION			OVER-ALL M
		B(EST)	W(ORST?)	M	
I.	(a) A better than B; B better than C	5.42	6.10	5.75	5.49
	(b) B better than C; A better than B	4.98	5.52	5.25	
II.	(a) C worse than B; B worse than A	6.27	6.53	6.40	5.91
	(b) B worse than A; C worse than B	5.93	5.04	5.47	
III.	(a) A better than B; C worse than B	5.35	5.34	5.34	5.33
	(b) C worse than B; A better than B	4.84	5.84	5.32	
IV.	(a) B worse than A; B better than C	5.00	6.02	5.49	5.63
	(b) B better than C; B worse than A	6.12	5.95	5.77	
I'.	(a) A not as bad as B; B not as bad as C	6.77	5.95	6.34	6.59
	(b) B not as bad as C; A not as bad as B	7.16	6.56	6.85	
II'.	(a) C not as good as B; B not as good as A	5.58	6.63	6.08	6.22
	(b) B not as good as A; C not as good as B	6.11	6.60	6.35	
III'.	(a) A not as bad as B; C not as good as B	6.34	6.66	6.50	6.52
	(b) C not as good as B, A not as bad as B	6.73	6.34	6.53	
IV'.	(a) B not as good as A, B not as bad as C	6.10	6.18	6.14	6.19
	(b) B not as bad as C; B not as good as A	5.48	7.12	6.25	

TABLE 1. Geometric mean times in solving three-term series problems (from Clark 1969:397, Table 3). Mean times are in seconds. Bold-face means are those referred to in the text.

However, the PH makes certain detailed predictions not systematically noted by Clark. The hypothesis is that, in constructing A is better than B, listeners first take the perspective of A. Then they imagine movement through the relation 'better than'. Then they reach point B. At the end of this process, perspective remains with A, but attentional focus is now on B. This model predicts that when one of the conditions in 30 is fulfilled, latency to problem-solving is minimal:

- (30) a. The starting point of the second premise has been constructed at that end of the series which is congruent with the form of the question.
 b. The last term of the second premise has been constructed at that end of the series which is congruent with the form of the question.

In Table 1, 30a holds for IbB, IIbW, IIIaW, and IIIbB, while 30b holds for I'aW, II'aB, IV'aW, and IV'bB. These eight means, which are in bold-face in Table 1, include the lowest two means within each of the groups below:

- (31) a. Comparative problems with *Which is best?*
 b. Comparative problems with *Which is worst?*
 c. Negative equative problems with *Which is best?*
 d. Negative equative problems with *Which is worst?*

Thus the PH as expressed in 30 predicts all the shortest latencies according to the classes of 31. It appears that recency of construction, taken together with congruence, is an important factor in solving three-term series problems.

5.3. ALTERNATIVE ACCOUNTS. What has been said in previous sections about the alternative accounts applies equally well to these studies by Huttenlocher and her associates and by Clark. It is hard to see how making a block immovable can affect its givenness or communicative dynamism. Non-functional accounts are equally irrelevant. Clark's deep-structural account of his own data involves implicit functionalist criteria in his use of marking theory.

6.1. TRANSITIVES. Wright 1969 and Olson & Filby have found that, after hearing a passive sentence, subjects found it easier to answer a passive than an active question. The PH views this as linguistic determination of perspective. AS noted by Clark, congruence of perspective facilitates processing.

Olson & Filby ran one experiment which would appear to show perceptual induction of a passive perspective. They showed subjects a picture of either a car or a truck; then they showed them either a car pushing a truck or a truck pushing a car. If the first picture showed the theme of a passive sentence, a passive sentence describing the second picture was more quickly verified than an active one. Olson & Filby seem to have induced a passive perspective, but the induction was not purely perceptual: in two previous experiments, all subjects had been trained in taking the perspective of either the agent or the patient. Moreover, this training involved several verbal aspects. Thus, as in the studies discussed in §4, the induction of a passive perspective seems to depend on linguistic determination.

The Olson & Filby studies provide general confirmation of the PH. Although the passive perspective results in somewhat longer verification latencies over-all, Olson & Filby show that passives are verified directly without translation into actives. This indicates that subjects can handle a complex perspective without reducing it to a simple perspective by transformation.

6.2. QUANTIFIERS. Carpenter & Just 1972 combined a picture verification task with eye-movement tracking. In Figure 2, given sentences like 32-34, subjects tended to fixate on the larger subset of dots:

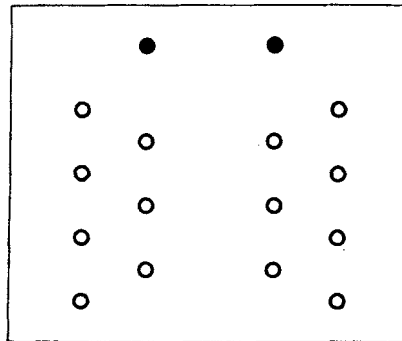


FIGURE 2.

- (32) Many of the dots are red (black).
- (33) Few of the dots are red (black).
- (34) A majority of the dots are red (black).
- (35) A minority of the dots are red (black).

However, given sentences like 35, they tended to fixate on the smaller set of dots. In an earlier study, Just & Carpenter 1971 had shown that few is coded as not many. This accounts for the tendency to fixate the larger set.

These results provide clear support for the PH. Subjects appear to move directly to the perspective of the starting point. From that perspective, they attempt to construct the proposition, and thereby determine its truth value.

PERSPECTIVE USE IN COMPREHENSION

7. In §1 we saw a number of illustrations of the way perspectives are used in comprehension. However, there are few experimental studies of comprehension as distinct from problem-solving and verification. Haviland & Clark 1974 find that subjects were quicker to understand what the second sentence means in sequences like 36 than in ones like 37:

- (36) We got some beer out of the trunk.
The beer was warm.
- (37) Andrew was especially fond of beer.
The beer was warm.

In terms of the PH, the assumption of the perspective of the starting point in the second sentence is facilitated by the presence of a definite image of that starting point in the first sentence. In 37, the image of beer remains indefinite and general. This assumption of a perspective can also be related to the fourth function of the starting point — Travnicek's function of linkage to thought.

PERSPECTIVE USE IN RECALL

8. Anderson 1963, Coleman 1965, Clark 1965, and Kintsch 1974 all observe that the starting point of both active and passive sentences is the element best remembered in free recall. Prentice 1966 demonstrates that cued recall is better when the cue is semantically related to the starting point than when it is related to the patient in the active, or to the agent in the passive. Turner & Rommetveit 1968 and Schlesinger 1968 have found that passives tend to be recalled as actives. However, when Turner & Rommetveit used the starting point as a recall cue, recall of passives as passives was increased. Examining errors in recall, Clark & Card 1969 found 63% correct recall for the starting point of comparative sentences like *The pie is better than the cake* or *The cake is as good as the pie*; but recall of the predicate nominal was only 37% correct.

Amplifying earlier results of Blumenthal 1967, Blumenthal & Boakes 1967 have found that the starting point prompted recall more effectively in 38 than in 39:

(38) John is eager to please.

(39) John is easy to please.

These results indicate that the more active the human perspective is, the more useful it is in remembering sentences.

These studies suggest quite uniformly that starting points serve a special function in recall. Moreover, this function seems to be related to perspective, since the more active the starting point is, the better the subsequent recall.

More recent studies have questioned this conclusion. James 1972 controlled imagery value of agent and patient nouns, and was able to eliminate the superiority of starting points in free recall. Perfetti & Goldman 1974 replicated James's finding for cued recall of isolated sentences. However, when Perfetti & Goldman placed their imagery-balanced sentences within paragraphs, a thematization effect returned. When the theme of the paragraph was coreferential with the starting point of the sentence to be recalled, it was more effective in prompting sentence recall than was the patient of the sentence to be recalled. However, it should be noted that this procedure may well have led to a temporary boost in the imagery value of the starting point.

James, Thompson & Baldwin 1973 found that, during recall, subjects tended to move high-imagery nouns to starting-point position. These results agree with the earlier research. In fact, James 1972 stands out as the only study which has found no evidence for superiority of the starting point in recall: controlling for imagery value of the starting point, James found no recall superiority for the starting point. However, Clark & Card also controlled for imagery value, and succeeded in detecting a large recall superiority. Moreover, they achieved perfect control of imagery value by using the same nouns in starting point and predicate nominal position. Given these positive results, James's negative results are difficult to interpret.

A recall study by Ertel 1974b underlines the importance of activity during encoding. Subjects were asked to remember eight simple German affirmatives and negatives, like these:

(40) The sheep is (isn't) small.

(41) The mouse is (isn't) nice.

While trying to remember these sentences, subjects were asked either to put two halves of a block together or to separate them. Ertel found that affirmative sentences were best recalled when the subject had learned them while putting the two halves together, and that negative sentences were best recalled when the subject had learned them while pulling the two halves apart. This interaction of sentence type and motor task was highly significant. Ertel's results provide confirmation of the active imitative construction hypothesized by Piaget and by the PH.

Slobin 1968 asked subjects of ages 5, 6, 8, 10, 12 and 20 to recall stories in either full or truncated passives. Recall of full passives was equally low at all ages, but there was a highly significant increase with age in the number of truncated passives recalled. The PH provides one possible account of these developmental results. Full passives have a complex perspective, in which the roles of agent and perspective are assigned to different elements. Truncated passives, on the other hand, have only a

perspective, with no agent; thus, rather than a complex perspective, they have a partial perspective. It would appear that the partial perspective, while more difficult than the simple one, is not as difficult as the complex perspective. Slobin's results confirm this trend.

SUMMARY

9. The studies and examples reviewed in this paper point toward the need for a dynamic conceptualization of the starting point. Starting points in the production and comprehension of sentences are also starting points for the active construction of sentences from a very specific type of perspective. The perspective used in constructing sentences is that assumed by the speaker-listener himself. In this sense, the speaker-listener actually involves himself with the sentence by 'getting inside it'.

Other attempts to clarify the status of the starting point and the conditions governing its selection have been shown inadequate. Non-semantic theories of starting-point selection are unable to deal with passive-active differences in ratings of the agent, with preferences for certain themes in elicited production, or with perceptual biases in the selection of starting points. Non-dynamic functionalist theories use categories that are often irrelevant to the psycholinguistic research findings. Huttenlocher's mental-movement theory of sentence comprehension in problem-solving bears superficial resemblances to the PH; however, its emphasis upon concrete images and the 'picking up' of themes in comprehension are at variance with the PH. Moreover, Clark 1969 shows how these details of Huttenlocher's model lead to erroneous predictions.

Of the functionalist models of perspective choice, those of Ertel 1974b and Clark 1974 are closest to the PH, Ertel's model being remarkably close: it differs primarily in making the subject, rather than the starting point, the focus of its concern. Clark's constructs of congruence, markedness, and perceptual determination are accepted by the PH; however, the notion of active perspective-taking goes beyond Clark's position, in that it takes the human perspective as the natural one for unifying the various dimensions and uses of markedness. The relation between the abstract, but highly motoric, imagery of the PH and the abstract mental code proposed by Clark and others will require further clarification.

Future research in the dynamics of starting-point assumption and sentence construction will need to look at these processes in real time. We can begin to get this kind of information from the studies by Carpenter & Just 1972 with eye tracking measures, Lindsley 1975 with decision points in sentence production, and MacWhinney 1975 with hesitation phenomena and perspective switches in elicited production.

REFERENCES

- ANDERSON, B. 1963. The short-term retention of active and passive sentences. Doctoral dissertation, Johns Hopkins University.
- AUDLEY, R. J., and C. P. WALLIS. 1964. Response instructions and the speed of relative judgments, I: Some experiments on brightness discrimination. *British Journal of Psychology* 55.59-73.
- BENES, E. 1959. Zocatek nemecke vety z hlediska aktualniho cleneni vetneho. *Casopis pro Moderni Filologii* 41.205-15.
- BEVER, T. G. 1970. The cognitive basis for linguistic structures. *Cognition and the development of language*, ed. by J. Hayes, 279-362. New York: Wiley.
- BLUMENTHAL, A. 1967. Prompted recall of sentences. *Journal of Verbal Learning and Verbal Behavior* 6.203-6.
- , and R. BOAKES. 1967. Prompted recall of sentences. *Journal of Verbal Learning and Verbal Behavior* 6.674-6.
- BOUCHER, J., and C. OSGOOD. 1969. The Pollyanna hypothesis. *Journal of Verbal Learning and Verbal Behavior* 8.1-8.
- CARPENTER, P. A., and M. A. JUST. 1972. Semantic control of eye movements during picture scanning in a sentence-picture verification task. *Perception and Psychophysics* 12.61-4.
- CARROLL, J. B. 1958. Process and content in psycholinguistics. *Current trends in the description and analysis of behavior*, ed. by R. Patton, 175-200. Pittsburgh: University of Pittsburgh Press.
- CLARK, H. H. 1965. Some structural properties of simple active and passive sentences. *Journal of Verbal Learning and Verbal Behavior* 4.365-70.
- . 1969. Linguistic processes in reasoning. *Psychological Review* 76.387-404.

- . 1974. Semantics and comprehension. *Current trends in linguistics*, vol. 12, ed. by T. A. Sebeok, 1291-1428. The Hague: Mouton.
- and S. K. CARD. 1969. The role of semantics in remembering comparative sentences. *Journal of Experimental Psychology* 83.545-53.
- , and W. G. CHASE. 1972. Perceptual coding strategies in the formation and verification of descriptions. *Memory and Cognition* 2.101-11.
- , and S. E. HAVILAND. 1976. Comprehension and the given-new contrast. To appear in *Discourse production and comprehension*, ed. by R. Freedle. Hillside, NJ: Lawrence Erlbaum Associates.
- COLEMAN, E. B. 1965. Learning of prose written in four grammatical transformations. *Journal of Applied Psychology* 49.332-41.
- ELLIS, S. H. 1972. Interaction of encoding and retrieval in relative age judgments: an extension of the 'crossover' effect. *Journal of Experimental Psychology* 94.291-4.
- ERTEL, S. 1974a. Satzsubjekt und Ich-Perspektive. Bericht über den 28. Kongress der Deutschen Gesellschaft für Psychologie, 1.129-39. Göttingen: Hogrefe.
- . 1974b. Gestaltpsychologische Denkmodelle für die Struktur der Sprache. *Gestalttheorie in der modernen Psychologie*, ed. by S. Ertel, L. Kemmler, M. Stadler, & D. Steinkopf, 94-105. Darmstadt: D. Steinkopf.
- , and W. BLOEMER. 1975. Affirmation and negation as constructive action. *Psychological Research* 37.335-42.
- FIRBAS, J. 1964. On defining the theme in functional sentence analysis. *Travaux Linguistiques de Prague* 1.267-80.
- . 1966. Non-thematic subjects in contemporary English. *Travaux Linguistiques de Prague* 2.239-56.
- HALLIDAY, M. 1967. Notes on transitivity and theme in English, part 2. *Journal of Linguistics* 3.199-244
- HAVILAND, S. E., and H. H. CLARK. 1974. What's new? Acquiring new information as a process in comprehension. *Journal of Verbal Learning and Verbal Behavior* 13.512-21.
- HUTTENLOCHER, J.; K. EISENBERG; and S. STRAUSS. 1968. Comprehension: relation between perceived action and logical subject. *Journal of Verbal Learning and Verbal Behavior* 7.527-30.
- , and S. STRAUSS. 1968. Comprehension and a statement's relation to the situation it describes. *Journal of Verbal Learning and Verbal Behavior* 7.300-304.
- , and S. L. WEINER. 1971. Comprehension of instructions in varying contexts. *Cognitive Psychology* 2.369-85.
- JAMES, C. T. 1972. Theme and imagery in the recall of active and passive sentences. *Journal of Verbal Learning and Verbal Behavior* 11.205-11.
- J. G. THOMPSON; and J. M. BALDWIN. 1973. The reconstructive process in sentence memory. *Journal of Verbal Learning and Verbal Behavior* 12.51-63.
- JOHNSON, M. G. 1967. Syntactic position and rated meaning. *Journal of Verbal Learning and Verbal Behavior* 6.240-46.
- JOHNSON-LAIRD P. N. 1968a. The choice of the passive voice in a communicative task. *British Journal of Psychology* 59.7-15.
- . 1968b. The interpretation of the passive voice. *Quarterly Journal of Experimental Psychology* 20.69-73.
- JUST, M., and P. CARPENTER. 1971. Comprehension of negation with quantification. *Journal of Verbal Learning and Verbal Behavior* 10.244-53.
- KINTSCH, W. 1974. *The representation of meaning in memory*. New York: Lawrence Erlbaum Associates.
- KUNOS. 1975. Three perspectives in the functional approach to syntax. *Papers from the Parasession on Functionalism*, 276-336. Chicago: CLS.
- LINDSLEY, I. R. 1975. Producing simple sentences: how far ahead do we plan? *Cognitive Psychology* 7.1-19.
- MACWHINNEY, B. 1975. The development of English and Hungarian pragmatics. Paper presented at the Third International Child Language Symposium, London.
- MARKS, D. F. 1972. Relative judgment: a phenomenon and a theory. *Perception and Psychophysics* 11.156-60.
- MATHESIUS, V. 1939. O tak zvanem aktualnim cleneni vety. *Slovo a Slovesnost* 5.171-4.

- OLSON, D., and N. FILBY. 1972. On the comprehension of active and passive sentences. *Cognitive Psychology* 3.361-81.
- OSGOOD, C. 1971. Where do sentences come from? *Semantics*, ed. by D. Steinberg & L. Jakobovits, 497-529. Cambridge: University Press.
- PERFETTI, C. A., and S. R. GOLDMAN. 1974. Thematization and sentence retrieval. *Journal of Verbal Learning and Verbal Behavior* 13.70-79.
- PIAGET, J. 1952. *The origins of intelligence in children*. New York: International Universities Press.
- , and B. INHELDER. 1971. *Mental imagery in the child*. London: Routledge & Kegan Paul.
- PRENTICE, J. L. 1966. Response strength of single words as an influence in sentence behavior. *Journal of Verbal Learning and Verbal Behavior* 5.429-33.
- SCHLESINGER, I. M. 1968. *Sentence structure and the reading process*. The Hague: Mouton.
- SHIPLEY, W.; J. COFFIN- and K. HADSELL. 1945. Affective distance and other factors determining reaction time in judgments of color preference. *Journal of Experimental Psychology* 35.206-15.
- SLOBIN, D. I. 1968. Recall of full and truncated passive sentences in connected discourse. *Journal of Verbal Learning and Verbal Behavior* 7.861-81.
- SOKOLOV, A. N. 1972. *Inner speech and thought*. New York: Plenum.
- TANNENBAUM, P. H., and F. WILLIAMS. 1968. Generation of active and passive sentences as a function of subject or object focus. *Journal of Verbal Learning and Verbal Behavior* 7.246-50.
- TRAVNICEK, F. 1962. O tak zvanem aktualnim cleneni vetnem Slovo a Slovesnost 22.163-71.
- TURNER, E. A., and R. ROMMETVEIT. 1967. Experimental manipulation of the production of active and passive voice in children. *Language and Speech* 10.169-80.
- , . 1968. Focus of attention in recall of active and passive sentences. *Journal of Verbal Learning and Verbal Behavior* 7.543-48.
- WALLIS, C. P., and R. J. AUDLEY. 1964. Response instructions and the speed of relative judgments, II: pitch discrimination. *British Journal of Psychology* 55.133-42.
- WRIGHT, P. 1969. Transformations and the understanding of sentences. *Language and Speech* 12.156-66.

[Received 10 May 1976.]