Acta Psychologica 41 (1977) 151–164

A STUDY OF MEMORY POINTERS*

Asher KORIAT and Israel LIEBLICH
Department of Psychology, Hebrew University, Jerusalem, Israel

Received March 1976

The primary aim of the present study was the delineation of characteristics of stimulus information likely to induce tip of the tongue (TOT) states. Sixty-two word definitions (pointers) were presented to 56 *S*s and the pattern of responses of each individual to each pointer was classified as reflecting one of nine memory states. Pointers were found to vary rather reliably (0.62) in the extent to which they tended to precipitate TOT states. The mapping of the pointers in terms of their tendency to precipitate the various memory states revealed that pointers differ in terms of two distinguishable dimensions: effectiveness in suggesting or eliciting the correct target, and degree of initial feeling of knowing evoked. The results were seen to suggest (1) that retrieval involves a preliminary stage of cursory pointer analysis which determines the likelihood that the solicited information is available and will be successfully retrieved; and (2) that the decision reached in this stage may depend on pointer characteristics different from those likely to determine success of the subsequent retrieval attempt. Pointer characteristics were identified which appear to affect each of the two dimensions described.

In the first systematic investigation of the tip of the tongue (TOT) phenomenon, Brown and McNeill (1966) asked *S*s to try to recall the uncommon English words that corresponded to the definitions which were presented. The results indicated that *S*s in a TOT state were able to provide correct partial information regarding the missing words prior to their retrieval. Gruneberg et al. (1973) have discussed the TOT phenomenon in terms of the concept of response blockage and have related it to the phenomenon of reminiscence. They, as well as Koriat and Lieblich (1974), have noted that the TOT phenomenon also illus-

* This research was supported by a grant from the Faculty of Social Sciences, The Hebrew University of Jerusalem. Requests for reprints should be sent to Asher Koriat, Department of Psychology, The Hebrew University, Jerusalem, Israel.

trates the individual's ability to monitor subjectively the contents of his memory even when retrieval fails. This principle has been more specifically investigated in studies of the 'feeling of knowing' (FOK). Such studies have demonstrated that the individual's judgments as to whether he does or does not know an as-yet unrecallable item are fairly accurate in predicting the success of subsequent retrieval or identification of the item (Gruneberg and Monks 1974; Hart 1965).

The present study involves two issues not previously investigated in studies of the TOT and FOK phenomena. The first concerns the circumstances giving rise to response blockages of the sort evidenced in the TOT and FOK states, where the individual feels he should be able to recall the solicited item but is temporarily unable to do so. Unsystematic observations by Brown and McNeill (1966) and by the present authors have suggested that certain word definitions are more effective than others in precipitating TOT states. The first aim of the present study was therefore to determine whether certain word definitions can be reliably characterized as especially likely to induce response blockage, and if so, to examine the nature of these definitions in an attempt to elucidate the underlying psychological processes.

The second, somewhat related issue is concerned with identifying that information which people use in determining whether a solicited item is likely to exist in memory. In discussing the processes involved in answering questions, Norman (1973) has postulated a preliminary rapid preprocessing stage in which the question is analyzed to determine both the probability that the relevant information has been stored and the effort required and probable success of an attempt at retrieval. In the present study the term 'pointer' will be employed to designate any cue, including word definitions, questions, and the like, intended to specify a particular memory entry whose retrieval is called for. The second aim of the present study was thus to attempt to determine what type of information people utilize in preliminary analysis of a pointer in order to estimate the likelihood that the solicited item exists in memory and the probability that it may be successfully retrieved. The approach to be employed involves two steps. First, memory pointers will be classified according to their effectiveness in inducing memory states such as 'Know', 'TOT', and 'Don't Know'. Next, pointers which tend to consistently elicit different initial estimates of knowledge will be analyzed and compared in terms of several structural and content attributes in an attempt to delineate possible determinants of the initial estimates of knowing.

The present study thus differs from previous investigations in that it focusses on FOK and TOT judgments as dependent rather than as independent variables. Previous studies, while demonstrating the validity of the feeling of knowing in predicting subsequent performance, have not dealt with the determinants of this feeling nor the processes involved in its generation. In the absence of any theoretical framework from which testable hypotheses regarding these issues may be derived, the approach adopted in the present study appeared promising for the purpose of producing guidelines for the directions in which such theory may proceed, and for the goal of generating hypotheses for future research.

The method employed in the present study rests on a classification of memory states proposed by Koriat and Lieblich (1974) according to the hierarchy of the possible outcomes which may occur for a single subject in the course of a single trial in a TOT procedure. The different patterns of outcomes define nine memory states which differ in terms of the initial subjective judgment associated with a pointer; whether or not a response is ultimately provided; and whether the individual's effective target proves to be the same as the target intended by E or different from it.

The analyses to be reported are based on the data collected by Koriat and Lieblich (1974) and described in their study. This previous report was based primarily on a comparison between the TOT and Don't Know states in terms of the correctness of S's guesses regarding parts and properties of inaccessible targets. The present report focusses on properties of pointers likely to give rise to different memory states, and particularly to the TOT state. The TOT state may be seen to combine two seemingly inconsistent features: the subjective conviction that the solicited target is available in memory and the objective inability to access it. One intriguing possibility is that these two features, 'subjective' and 'objective' knowledges are independently determined by different characteristics of pointers. This possibility was explored through a multidimensional analysis of nine memory states according to the degree to which they tended to be precipitated by the same pointers. The second step involved an attempt to delineate which features of pointers are likely to result in 'objective' and/or 'subjective' knowing.

The experiment

Method

The results to be reported were collected as part of a study on the TOT phenomenon (Koriat and Lieblich 1974). The reader is referred to that study for the full description of the method employed and the definition of the memory states. Since familiarity with the classification of memory states is essential for the understanding of the analyses to be reported here, it is outlined below.

When presented with a pointer, such as a word definition, the individual may signal any of three things: that he knows the target word and is able to provide it (Know), that he is unable to immediately reproduce the target word but that its retrieval is felt to be imminent (TOT), or that he does not know the word (Don't Know). The target word provided under the Know condition may be either identical with that intended by the experimenter (Correct) or different from it (Incorrect). An *S* initially reporting either a TOT or a Don't Know state may still recall a target before the trial is over, the *S* may identify the correct word (read out by *E* at the end of the trial) as the same as or different from the target he was searching for (Intended or Unintended).

The results to be reported are based on 56 *S*s each of whom responded to 62 word definitions. The response of each individual to each word definition was classified into one of the nine memory states.

Results

Reliability of pointers

The first analysis to be reported concerns the hypothesis that pointers differ reliably in the degree of initial feeling of knowing which they evoke. To evaluate this hypothesis, *S*s were divided randomly into two groups of 28 *S*s each. For each group, frequency of *S*s signaling an initial judgment of Know, Don't Know, or TOT was determined for each of the 62 pointers. For each of the three judgments, Pearson correlations were calculated over the 62 pointers between the numbers of *S*s in the two groups who signaled it. These correlations were found to be 0.77 for Know judgments, 0.80 for Don't Know judgments and 0.62 for TOT judgments. All correlations were significant well beyond the 0.001 level. The high reliabilities obtained for Know and Don't Know judgments are probably not too surprising, reflecting, at least in part, differences in item difficulty. The reliability found for TOT judgments is rather remarkable, however, because it indicates that word definitions differ consistently in the effectiveness with which they precipitate TOT judgments. This finding lends support to the proposition that much can be learned about the nature of the TOT state and its determinants from an analysis of pointers.

Analysis of memory states

The second analysis that was undertaken involved the mapping of the nine memory states in terms of the degree to which each pair of states tends to be

Table 1
Intercorrelations among nine memory states.

	1	2	3	4	5	6	7	8	9
1. Know–Correct	–								
2. Know–Incorrect	−0.36	–							
3. TOT–Intended	0.46	−0.41	–						
4. TOT–Unintended	−0.12	−0.24	0.17	–					
5. TOT–Got it–Correct	0.55	−0.27	0.47	0.11	–				
6. TOT–Got it–Incorrect	−0.29	0.21	−0.06	0.30	0.00	–			
7. Don't Know	−0.21	−0.61	−0.14	−0.27	−0.27	−0.39	–		
8. Don't Know–Got it–Correct	0.12	−0.14	0.30	−0.05	0.09	0.11	0.05	–	
9. Don't Know–Got it–Incorrect	−0.30	−0.09	−0.12	−0.16	−0.22	0.05	0.24	−0.14	–

precipitated by the same pointers. For each of the 62 pointers, the number of *S*s in each of the nine memory states was determined. The number of *S*s in each of the states was correlated with the number of *S*s in every other state over the 62 pointers. The intercorrelations appear in table 1.

The data of table 1 were submitted to a Guttman-Lingoes Smallest Space Analysis (SSA; Guttman 1968; Lingoes 1972). SSA is a nonmetric method of mapping a matrix of intercorrelations on a coordinate space of the minimal required number of dimensions so that the distances between points tend to preserve the size order of the correlations between the corresponding variables. Analysis of the correlation matrix in a space of two dimensions produced a good fit (coefficient of alienation 0.123) and is presented in fig. 1.

The results were also submitted to a principal axis factor analysis. The first two factors yielded a representation of the data very similar to that appearing in fig. 1, and will not be reported.

Also presented in fig. 1 are the results of an analysis yielding an estimate of the stability of the representation obtained. In this latter analysis the frequencies of the nine memory states found for each of the two groups were combined to yield 18 scores for each of the 62 pointers. The intercorrelations among the 18 scores were submitted to an SSA analysis. A two-dimensional representation yielded a coefficient of alienation of 0.180, and is presented in fig. 1 along with the results for the full sample. The stability of the location of each memory state in the representation space can be estimated from the proximity of the two points representing each memory state. As can be seen, the points representing the same state occupy the same general region of the two-dimensional space, indicating cross validation of the representation based on the full sample.

Examination of fig. 1 reveals that the first, horizontal dimension most probably represents the likelihood of retrieving or identifying the 'correct' target intended by *E*. The right region includes three states which differ in the initial feeling of knowing but in all of which the correct target is actually retrieved, and one state (TOT-Intended), where retrieval fails but the correct target is identified as that sought. The left region contains three states which differ in initial feeling of knowing but in all of which an incorrect target is retrieved, and one state (TOT-Unintended), where no target is actually retrieved, and one state is not judged by

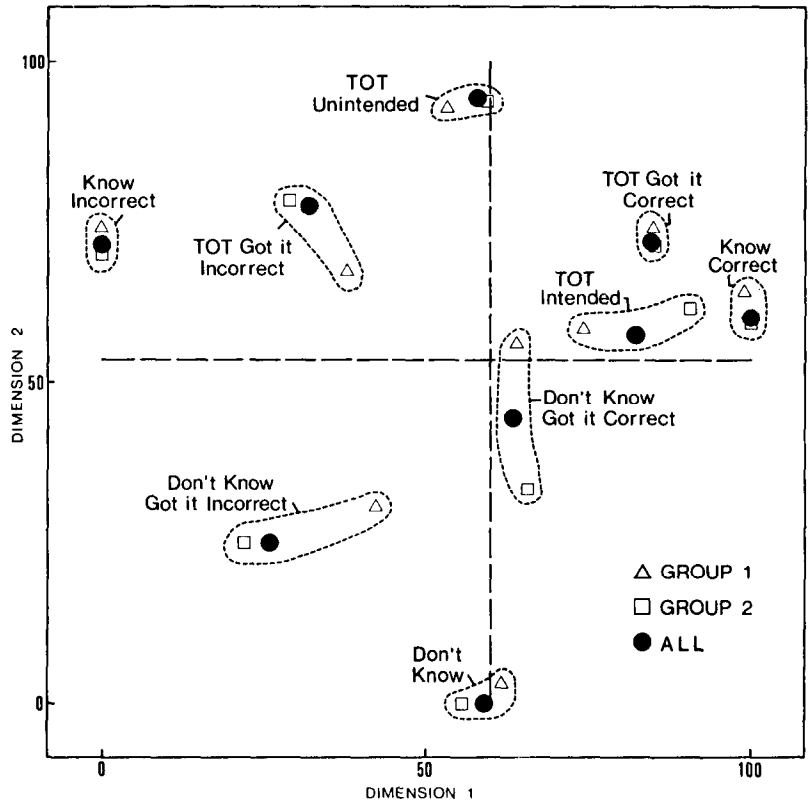

Fig. 1. An SSA configuration of the nine memory states in a two-dimensional space.

the *S* to be that which he was seeking. The ninth state, Don't know – which does not involve the production or identification of a target – falls in the middle of the horizontal dimension. The first dimension thus represents the likelihood of arriving at the correct target word.

On the other hand, the second, vertical dimension seems to represent the subjective feeling of knowing, contrasting the states where the target is initially judged unavailable in memory (Don't Know) with those where it is initially judged to be immediately or imminently accessible.

The primary significance of these results is that the dimension representing the subjective feeling of knowing appears clearly distinguishable from that representing actual objective knowing. Thus, word definition pointers may be characterized in terms of two dimensions; the likelihood of their suggesting or eliciting the correct target, and the likelihood of their evoking a preliminary feeling of knowing or not knowing. The two dimensions, considered conjointly, can thus be seen to divide the space into four quadrants (see fig. 1), the most interesting of which are the upper-left quadrant which represents an unwarranted feeling of knowing, and the lower-right quadrant which represents an unwarranted initial feeling of not knowing.

Table 2
Examples of typical pointers scoring high and low on Dimensions I and II.

Dimension II	Dimension I	
	Low	High
High	62. Foxy, cunning, crafty (Vulpine). 30. A circle, or any indication of radiant light, around the heads of divinities, saints, sovereigns in pictures, medals, etc. (Nimbus). 33. To cast coquettish glances designed to attract (Ogle).	5. A diffusion which proceeds through a semi-permeable membrane typically separating two solutions and tending to equalize their concentration (Osmosis). 34. An instrument for measuring angular distances in navigation (Sextant).
Low	35. A plant growing in the S.W. United States, which has long, pointed, often rigid leaves and which bears a large cluster of white blossoms (Yucca). 6. The common chamber into which the intestinal, urinary, and generative canals discharge in birds, reptiles, amphibians, and many fishes (Cloaca).	9. In Norse mythology, the hall in which the souls of heroes slain in battle are received (Valhalla). 16. Hermes staff as a symbol of a physician (Caduceus). 50. The science of coins (Numismatics).

Analysis of pointers

The results of the factor analysis were used to calculate two factor scores for each of the 62 pointers, effectiveness in eliciting the correct target and strength of the initially evoked feeling of knowing. The medians of the two factor scores were then used to classify the pointers into four categories representing all combinations of high and low scores on the two dimensions. The propositions to be offered below regarding pointer qualities likely to be associated with each of the two dimensions rest primarily on a qualitative examination of the four groups of pointers. Quantitative comparisons among the four groups of pointers in terms of several scoreable characteristics will also be presented. The results of these comparisons, however, should be considered only as illustrative of the propositions to be offered rather than as tests of their validity. Table 2 presents examples of typical word definitions representing each of the four types of pointers.

The two-dimensional classification suggests three possible facets according to which pointers may be differentiated: first, the effectiveness with which they distinctively suggest the target in question (Dimension I); second, the degree of initial feeling of knowing they induce (Dimension II); and third, the accuracy of this feeling of knowing judgment (a facet which, in a sense, refers to the relationship between the two dimensions). The distinction between the last two facets should be kept in mind in the following discussion. Certain pointer properties appear pertinent to Dimension II – they may be seen to increase or reduce the initial feeling of knowing regardless of its accuracy in predicting actual knowledge.

Other properties appear to be pertinent to the third, relational facet; they seem to affect the accuracy of the inital feeling of knowing, i.e., the *S*'s tendency to feel that he knows when he knows, and that he does not when he does not. The latter two facets are analogous to what has been referred to in signal detection theory as criterion and sensitivity, respectively.

The qualitative examination of the differences between the four types of pointers reveals several factors likely to account for the position of the pointers in the two-dimensional space. These factors may be roughly divided into those pertaining to the nature of the pointer and those pertaining to the nature of the target in question. This distinction appears to be conceptually important, though the two sets of factors are intimately tied empirically, as will be seen below.

First of all, the nature of the pointer seems to be described by one major dimension, a dimension which is perhaps best characterized in terms of the conditions that the pointer provides for an effective memory search. Pointers appear to differ in terms of the specificity with which they delimit a well-circumscribed memory address, and provide clear direction toward the region of semantic memory where the solicited target is likely to reside. Effective or 'focussed' pointers (e.g., no. 35 in table 2) all tend to cast the specification of the solicited target in a format that simultaneously constitutes an effective plan for search, in contrast to 'vague' or 'diffuse' pointers (e.g., no. 62 in table 2) which offer no such plan. Our results suggest that this dimension is primarily associated with the accuracy of the initial feeling of knowing, although it also may very well be expected to affect the likelihood of accessing an available entry. By allowing the individual's memory scanner to zero in on a specific memory location, a specifically attuned pointer seems to aid in obtaining an accurate preliminary estimate of the likelihood of successful retrieval before the search task is begun. Well-attuned pointers were therefore found more likely to occupy the upper-right and lower-left quadrants of the two-dimensional space.

Several more specific factors comprise this first dimension. These factors seem to contribute to the effectiveness of a pointer in the sense described above, and to improve the accuracy of the initial feeling of knowing. First among them is the presence of an implicit or explicit specification of a general, well-defined superset to which the solicited target belongs. The delineation of such a superset (e.g., plants growing in a certain geographical region, anatomical organ, etc.) probably allows a rough estimate of the likelihood that the solicited target has been learned, and will be successfully retrieved. A second factor is the use of a definition format in which the target is specified through converging operations and is represented as the conjunction of several interlocking specifications. Pointers with this type of format seem to be associated with a higher FOK accuracy than pointers such as those in which, for example, some or all of the specifications are intended to apply disjunctively. The third factor contributing to FOK accuracy is simply the amount and specificity of information conveyed regarding the target, as reflected, for example, in the number of conjunctive specifications provided. Interestingly, redundant information such as repetition or addition of alternative specifications appears to be associated with a stronger overall feeling of knowing, regardless of the

accuracy of this feeling. On the other hand, longer definitions containing a large number of conjunctive specifications tend to be associated with an initial feeling of not knowing which is often accurate. Apparently, such definitions often result in a preliminary decision that there is no sense in even going to the bother of searching for the target. A fourth factor is worth mentioning, though it is based only on a few impressions. It is related to what Norman (1973) has referred to as the paraphrase problem. Some of the word definitions seemed to us to specify the target in a format different from that of its storage in memory, and may have had to be paraphrased by the *S*s before the final attempt at retrieval. These definitions tended to elicit an unwarranted feeling of not knowing (lower-right quadrant), as reflected, for example, in the Don't Know-Got-it-Correct state. With word definitions of this sort the initial FOK judgment was apparently based on a preliminary analysis of the information in the format in which it was presented, while the search was carried out on the paraphrased definition.

The second set of factors seem to pertain more to the nature of the target indicated than to the nature of the pointer, although it is clearly reflected in the latter as well. Memory targets may be said to vary in their degree of pointability. This dimension may be readily seen to operate in the Twenty Questions game where some targets appear more easily zeroed in on than others in terms of the common dimensions of classification reflected in the player's question. Memory entries such as words similarly appear to differ in the degree to which they can be distinctively pointed at. This in turn appears to depend on two factors, the first of which is the nature of the target word indicated. Words designating abstract concepts, for example, appear to be of lower pointability than words designating concrete objects. A concrete object generally has several distinctive tags, and may afford a convergent definition in terms of its physical characteristics, function, location, etc. Such a definition may be specific enough to produce an articulate image of the object whose name is called for, and the *S* may find himself on solid grounds in estimating the chances of retrieving the name. A word designating a relation (e.g., an action or a property) generally seems to be harder to point at than a word designating an element (e.g., an object), though there may be differences in pointability among words of either type.

Differences in the pointability of terms may be readily extracted from a study of the various tactics employed by dictionaries to indicate word meanings. The meanings of some terms are relatively clearly indicated through a converging definition, while those of others are merely suggested through other terms having somewhat similar significances. One technique commonly used in connection with the latter type of definition is that of a seemingly redundant repetition: rather than combining to converge on the meaning of the term in question, the various parts of the definition represent a recapitulation of the same general meaning, as if to increase the chances that the indicated meaning will come to mind.

The second aspect of pointability concerns the degree to which a target can be distinctively pointed at to the exclusion of other target candidates. This appears to depend on the existence of other targets in the vicinity of the critical target which appear to satisfy the definition reasonably well. This is not to say that the critical

Table 3.
Number and percentage of pointers bearing each of seven characteristics, by Dimensions I and II.

Characteristic	Dimension I Dimension II	Low Low	Low High	High Low	High High
	No. of pointers	16	15	15	16
Relation		2 (12%)	5 (33%)	2 (13%)	7 (44%)
Location		5 (31%)	2 (13%)	4 (27%)	1 (6%)
Science		4 (25%)	1 (7%)	3 (20%)	5 (31%)
Repetition		4 (25%)	8 (53%)	5 (33%)	7 (44%)
Conjunction		7 (44%)	4 (27%)	6 (40%)	8 (50%)
Specificity		12 (75%)	4 (27%)	8 (53%)	5 (31%)
Confusability		9 (56%)	12 (80%)	2 (13%)	9 (56%)

target cannot be defined on objective grounds as the sole 'correct' response. However, *S*s presented with such a pointer may initially employ it do define the approximate location of the target in the semantic space, and their initial FOK judgment may be affected by the existence or absence of entries in that approximate location.

As may be expected, pointability, in both of the above senses, seems to be associated with the effectiveness of retrieving or 'thinking of' the correct target (Dimension I). Words denoting elements, for example, generally tend to be more effectively suggested than words denoting actions or properties. Pointability is also associated with the two facets of feeling of knowing: word definitions pertaining to a target low in pointability tend to be associated with stronger initial FOK judgments, together with a lower predictive accuracy of this judgment, than word definitions pertaining to targets high in pointability.

Table 3 presents some quantitative data intended to illustrate a few of the propositions presented above. Each of the 62 word definitions was classified by two judges in terms of the presence or absence of each of seven characteristics. (Agreement between the judges was perfect in all but three cases which were settled after discussion.) The number and percentage of items for which each of the characteristics was present is displayed in table 3 for each of the four types of pointers representing high and low scores on Dimensions I and II. The seven characteristics were defined as follows.

(a) Relation – pointer designated an action (verb) or a property (an adjective).

(b) Repetition – pointer contained several parts, each of which appeared to constitute an independent definition (e.g., no. 62 in table 2).

(c) Location – pointer specified a geographical location (e.g., nos. 35 and 9 in table 2).

(d) Science – pointer referred to a concept pertaining to a particular science, and could have been regarded as a technical term (e.g., no. 5 in table 2).

(e) Conjunction – the various parts of the pointer definition were connected explicitly or implicitly by 'and'.

(f) Specificity – the number of words in each definition was used as a crude index of the amount and specificity of information conveyed about the target. Pointers containing an above-average number of words were scored as specific.

(g) Confusability, or presence of approximate alternative targets – all the incorrect words supplied by the *S*s in the four states involving an incorrect response were listed for each definition. A word was defined as an approximate target if it was supplied by more than one *S*. The ratio of the number of *S*s supplying an approximate response to the number of *S*s supplying an incorrect response was used as an estimate of the extent to which there were other words in the vicinity of the solicited target which might have seemed approximately to satisfy the same definition. The mean of the proportion scores was used to divide the 62 word definitions into those where the target is 'distinguishable' and those where the target is 'confusable'.

All of the seven characteristics represent rather crude indices of the factors that emerge from a qualitative examination of the pointers, and cannot be expected to capture the wealth of information which emerges from this examination. Nevertheless, they appear to reveal some of the more prominent trends. The results of table 3 suggest that the seven variables may be classified into three categories in terms of their effects on the feeling of knowing. The first category includes Location and Relation, both of which appear to affect mainly the level of initial feeling of knowing. The presence of a geographical specification reduces initial feeling of knowing regardless of the eventual accuracy of this feeling, and a pointer designating a relation appears to evoke a stronger feeling of knowing than one designating an element. The second category includes Science and Conjunction, which seem to affect accuracy of initial FOK: pointers specifying scientific domains, or employing converging specifications apparently provide safer grounds for the preliminary estimate of the likelihood that the solicited item is available in memory. The third category includes Repetition, Number of Words and particularly Confusability, where the main effect is on the false-alarm rate of the FOK accuracy. As may be expected, the presence of responses which approximately satisfy the definition seems to raise the rate of false positive feeling of knowing. However, Confusability appears to raise the feeling of knowing even when the correct target is zeroed in on. This latter effect may suggest that the preliminary analysis of the definition involves a cursory inspection of a broader region of memory including many entries, some of which satisfy the definition only grossly. The ease with which entries from this region come to mind then affects the estimate that the correct target will be found. Short definitions also appear to generate a larger amount of false alarm FOK, as opposed to longer definitions, which tend to produce a stronger feeling of not knowing, particularly when the correct target is likely to be unavailable. The presence of repetitions in the definitions similarly appears to raise the level of FOK and the rate of false alarm-FOK in particular. Both short definitions and the presence of repetitions may affect FOK through the same mechanism suggested in connection with Confusability: they may facilitate the emergence into mind of likely candidates during the stage of preliminary analysis, and thus raise the confidence that the correct target will be found.

Discussion

The initial motivation for the present investigation was the desire to delineate some of the conditions likely to result in response blockages of the sort evidenced in the FOK and TOT states. The preliminary lead was supplied by the finding that word definitions differ rather reliably in the effectiveness with which they tend to precipitate TOT states, a finding which suggested that much of the variance in the occurrence of TOT experiences may be readily accounted for in terms of pointer variables. On intuitive grounds, the TOT phenomenon, often described as a peculiar state of mind, may have seemed to be determined by idiosyncratic conditions pertaining to the state of knowledge of the particular subject and to the manner in which the solicited information is stored in his memory. One of the main contributions of the present report therefore lies in its emphasis on stimulus determinants, and thus on variables appearing to have normative or cross-individually consistent effects.

The major substantial contribution lies in the finding that when memory pointers are mapped in terms of the memory states they tend to precipitate, two fairly distinct dimensions of pointers emerge: first, the effectiveness with which the pointer tends to elicit or suggest the intended target; and second, the degree of initial feeling of knowing evoked. The separation of the two dimensions suggests several important implications regarding the cognitive processes involved in searching for solicited information. First, it highlights the principle, stressed mostly by Norman and his associates (e.g., Lindsay and Norman 1972; Norman 1973) that the search for solicited information involves a preliminary stage in which the content of the pointer is analyzed to evaluate the chances that the information exists in memory and may be successfully retrieved. This preliminary stage may result in the decision not even to initiate a memory search, though such a decision apparently does not entirely block the process of memory scanning, as evidenced by the several instances of Don't Know–Got it–Correct. Second, the finding of a dimension of feeling of knowing which is separate from 'actual' knowing suggests that the decision in the preliminary analysis stage rests on aspects of pointer information different from those which may determine the success of the subsequent retrieval attempt. This is clearly inconsistent with a simple model of retrieval which has been critically discussed by Norman (1973). According to this model, the

process of answering a question involves searching memory for the solicited information. If retrieval is successful, the answer is provided; if not – the answer is "don't know". The assumption in this model, that the 'Know' or 'Don't Know' decision depends on the outcome of the retrieval attempt is clearly inconsistent with the general finding of the present study that the extent of feeling of knowing associated with a pointer is distinct of the likelihood of successful target retrieval or identification. We may note in this connection that the emergence of feeling of knowing and likelihood of correct knowing as distinguishable dimensions across pointers is in no way inconsistent with the general finding of other studies that within-individuals, FOK judgments tend to predict accurately the success of the subsequent recognition or retrieval of the solicited information (Hart 1965; Gruneberg et al. 1973).

Another general contribution lies in the analysis delineating characteristics of pointers associated with Dimensions I and II. In this analysis a distinction was offered between factors more likely to pertain to the nature of the pointer, and those more likely to pertain to the nature of the target in question. Although the two sets of factors appear intimately related, the above-mentioned distinction is worth retaining in view of its apparent methodological and conceptual implications. From a methodological point of view, the distinction between pointer and target characteristics is a distinction between factors which are in principle more readily subject to experimental manipulation and those that are less so. The findings regarding pointer characteristics suggest several possible ways in which a pointer may be varied so as to produce differences in likelihood of correct retrieval, in level of initial judgment of knowing, and in the accuracy with which this judgment predicts actual identification or retrieval. Thus, adding redundant information to an otherwise unmodified pointer is expected to increase overall initial feeling of knowing without necessarily affecting likelihood of correct retrieval. Accuracy of initial feeling of knowing, on the other hand, may be expected to increase if the pointer is worded so as to include specification of the class of words to which the solicited target belongs. Such a specification, even if it does not facilitate retrieval, may provide a more accurate preliminary estimate of the probable success of the subsequent attempt at retrieval. Specifying a target in the format in which it is stored by the subject is expected to increase both the likelihood of retrieving the target as well as the accuracy of initial feeling of knowing. So will the specification of the target in terms of a

format which simultaneously constitutes a plan for search.

On the other hand, the observations regarding target characteristics have an important implication which may have gone unnoticed. They suggest a general dimension – pointability – in terms of which memory entries may be arranged. This dimension may be expected to play an important role in the ease and success of various memory search tasks, and may be worth further investigation, particularly in view of the observation that different types of memory entries (e.g., words designating an action vs words designating an object) appear to differ systematically on this dimension.

References

Brown, R., and D. McNeill, 1966. The "tip of the tongue" phenomenon. Journal of Verbal Learning and Verbal Behavior 4, 325–337.

Gruneberg, M. M. and J. Monks, 1974. Acta Psychologica 38, 257–265.

Gruneberg, M. M., R. L. Smith and P. Winfrow, 1973. An investigation into response blocking. Acta Psychologica 37, 187–196.

Guttman, L., 1968. A general nonmetric technique for finding the smallest coordinate space for a configuration of points. Psychometrika 33, 469–506.

Hart, J. T., 1965. Memory and the feeling of knowing experience. Journal of Educational Psychology 56, 208–216.

Koriat, A., and I. Lieblich, 1974. What does a person in a "TOT" state know that a person in a "don't know" state doesn't know. Memory and Cognition 2, 647–655.

Lindsay, P. H., and D. A. Norman, 1972. Human Information Processing. New York: Academic Press.

Lingoes, J. C., 1972. A general survey of the Guttman-Lingoes nonmetric program series. In: R. N. Shepard, A. K. Romney, and S. B. Nerlove (eds.), Multidimensional scaling. New York: Seminar Press.

Norman, D. A., 1973. Memory, knowledge, and the answering of questions. In: R. L. Solso (ed.), Contemporary issues in cognitive psychology: The Loyola Symposium. Washington, D.C.: Winston.