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What does a person in a "TOT" state know that a person in a "don't know" state doesn't know*

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The purpose of this study was to examine the significance of Brown and McNeill's (1966) findings regarding the "tip of the tongue" (TOT) phenomenon. A modified version of their procedure was used with 56 Ss. Although their findings that Ss in a TOT state can detect parts and properties of the missing word were generally replicated, a division of the TOT state into a variety of substates showed correct detection rate to vary greatly, depending on the substate involved. In addition, correct detection of partial information was demonstrated even when S declared he had no knowledge of the selected word (don't know). It was suggested that a distinction be made between information detection based on knowledge of the characteristics common to the class of items of which the target is a member ("class detection") and detection based on knowledge of characteristics specific to the target in question ("differential detection"). Both class and differential detection were found to obtain in TOT states as well as in the don't know state. Some theoretical and methodological implications were suggested.

It is a common observation that individuals retain far more information than they are capable of retrieving at any given moment. Indeed, Tulving and his associates (cf. Tulving & Pearlstone, 1966) suggested that a considerable amount of nonrecall is due to the inaccessibility of otherwise intact memory traces and that memory can be best conceptualized as a limited-capacity retrieval system.

Some insight into the mechanism of retrieval can be gained from the study of the "tip of the tongue" (TOT) state, where the inability to retrieve otherwise available information is experientially most impressive. The TOT state refers to a situation in which complete recall is not presently possible but is felt to be imminent; it represents a midpoint between states where the sought-after information is readily accessible to recall and those where the information is felt to be totally inaccessible. Descriptions of the TOT state based on natural observations have been provided by James and Wenzl (see Woodworth & Schlosberg, 1954), but Brown and McNeill (1966) were the first to present a quantitative analysis of TOT data which were collected in a systematic fashion. They demonstrated that, while in the TOT state and prior to recall, Ss were able to guess correctly some of the letters in the missing word, the number of syllables in it, and the location of the primary stress. On the basis of these findings, Brown and McNeill offered a general model of the manner in which words are stored in memory and retrieved from it. They suggested that long-term memory for words and definitions is organized into a mental equivalent of a dictionary and specified some of the properties of this dictionary.

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It is our belief that Brown and McNeill's presentation has been accepted as a definitive and exhaustive description of the TOT state and has, therefore, neither been seriously challenged nor has produced any major new developments since its publication. The purpose of the reported study is to present a more refined methodological analysis of TOT data. It is proposed that such an approach will ultimately contribute to a greater insight into the processes underlying this phenomenon as well as opening new lines of investigation.

Consider the following question: How many syllables are there in the first name of the expert research assistant who ran the reported experiment?[1] We believe that most of the readers will guess correctly if given the choice: "Is it 2 or 10?" In answering, the reader might have relied on general assumptions based on his past experience (e.g., "No one's first name is comprised of 10 syllables," "No normal experimenter would employ an assistant whose first name is a 10-syllable word," etc.). Less dramatically, we would bet that Ss, asked how many syllables there are in the name of a new anticancer drug, would guess 3 or more. If such a drug existed, the probability of a correct guess would be greater than chance.

What would be the implications of such correct guesses regarding the manner in which information is stored in memory or retrieved from it? Would the reader conclude that the name of the assistant or the anticancer drug are stored in his memory dictionary? It is fairly reasonable to conclude that the results of this experiment have little implications regarding the organization of memory, at least not in the sense that this term is employed by Brown and McNeill. They may reveal something about the nature of language or of the individual's general assumptions regarding the

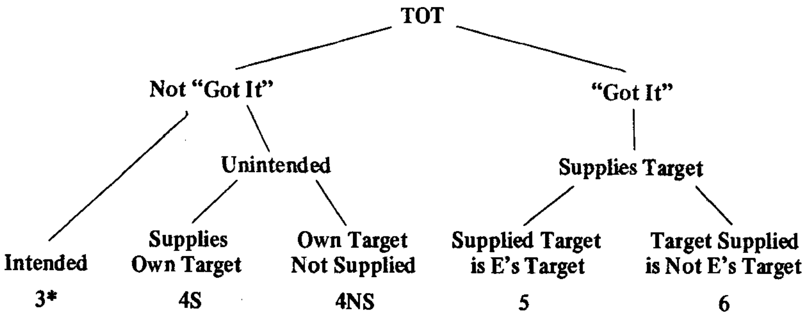

Fig. 1. Possible pathways of a S signaling he is in a TOT state. *For the meaning of these numerals, see Table 1.

probability of events in his world, but little about the way *specific* memory entries are stored and retrieved.

In order to find out whether the results obtained by Brown and McNeill have any bearing whatsoever on the storage and retrieval of specific memory items, it is crucial to determine whether the same findings are observed in a "don't know" state, i.e., a state in which the individual is confident that he has no knowledge of the solicited item. It is the purpose of this study first to examine the extent to which S can provide valid partial information regarding a target item when he declares that he has no knowledge of it ("don't know"), and second to determine what a S in a TOT state knows that a S in a "don't know" state does not know.

In addition, an attempt will be made to study a variety of TOT states, some of which have been lumped together in the Brown and McNeill study, and to show that these substates can be meaningfully distinguished from each other in terms of the amount of partial information provided by Ss regarding the missing word, and probably in terms of the underlying processes involved in each. It is our belief that Brown and McNeill's work owes much of its impact to the impressively high correct detection rates reported to obtain in the TOT state. A more refined analysis might prove the effect to be less dramatic.

To clarify the terminology employed in this study, consider the following question taken from Brown and McNeill's study: "What is the word designating a small boat used in the river and harbor traffic of China and Japan?" (a) I know the word. It is . . . (b) I don't know the word. (c) I am in a TOT state.

When in a TOT state, S is asked to guess various characteristics of the word solicited. He may either recall the word before the trial is over ("got it") or he may not ("not got it"). At the end of the trial, E reads out the correct word and S indicates whether this word was the one intended by him ("intended") or not ("not intended"). If the word read out is marked as "unintended," S is asked to supply, if he can, the word he has been searching for.

The word which E has in mind in this example is "sampan." This word is E's target. The word thought by S, with respect to which he makes his judgments as to whether he knows, he does not know, or is in search of, may either coincide with E's target ("sampan") or be another word such as "junk." For the sake of convenience, a target will be referred to as "S's target" or "S's actual target" only when it differs from E's target.

Figure 1 describes the possible alternative pathways of an S signaling he is in a TOT state. Five different TOT substates will be distinguished on the basis of the various possible paths. They have been labeled by numerals which appear at the bottom of Fig. 1.

It is clear that the validity of the various partial informations provided by S can, in theory, be evaluated either against E's target or against S's target. In one case, however, designated as 4NS in Fig. 1, S's actual target is not known.

In the present study an attempt will be made to obtain estimates of the amount of information available to S in each of the substates, using as criteria (a) E's target and (b) S's target when known. These estimates will be compared with those obtained from a control condition, namely, a state in which S declares he has no knowledge of the solicited word.

METHOD

Subjects

Fifty-six students enrolled in a 1-year program at The Hebrew University, whose native language was English, participated in one of three evening sessions approximately 2 h long. The Ss were paid for their time.

Word List

The list consisted of 62 uncommon words and their definition as used by Brown and McNeill.[2] The word level is exemplified by the following: apse, obdurate, ambergris, and sampan. There were 11 words of one syllable, 27 of two syllables, 19 of three syllables, and 5 of four syllables.

Response Sheet

The response sheet was laid out in vertical columns headed as follows: (1) State of knowledge: (a) know; (b) TOT; (c) don't know. (2) Number of syllables. (3) Guessed letters: (a) initial letter; (b) any middle letter; (c) last letter. (4) Words of similar sound: (a) closest; (b) middle; (c) farthest. (5) Location of stress: (a) beginning; (b) middle; (c) end. (6) Intended word: (+) one I was thinking of; (–) not one I was thinking of. (7) Word you had in mind if not intended word.

Procedure

Ss were instructed as follows: "In this experiment we are concerned with that state of mind in which a person is unable to think of a word that he is certain he knows, the state of mind in which a word seems to be on the tip of one's tongue. Our technique for precipitating such states is, in general, to read definitions of uncommon words and ask the subject to recall the word.

"(1) We will first read the definition of a low frequency word.

"(2) After the definition has been read you would find yourself in either one of three states: 'know,' 'don't know,' or 'tip of the tongue.' If you should happen to *know* the word at once, check 'know' in column 1, and write the word down in the same column. There is nothing else for you to do at the moment, just wait.

"(3) If you are unable to think of the word but feel sure that you know it and that it is on the verge of coming back to you, then you are in a *tip of the tongue* state. Check TOT in column 1 and begin at once to fill in the remaining columns of the response sheet.

"(4) If you should simply *not know* the word, you should check 'don't know' in column 1. In addition to the 'tip of the tongue' state we are also concerned with the 'guess' state in which you might be able to make reasonable guesses regarding certain characteristics of the intended words although you have already marked 'don't know' in column 1. Begin at once to fill in the remaining columns of the response sheet by guessing the answers. Do not hesitate to guess no matter how unsure you are.

"(5) When everyone has finished, we will read the target word. At this time, everyone is to write the word in column 6 of the response sheet. Those of you who simply did not know the word or thought of a different word, will now write the word we read. For those of you who have been in the TOT state, two eventualities are possible. The word may strike you as definitely the word you have been seeking. In that case please write a '+' after the word as the instructions at the head of column 6 direct. The other possibility is that you will not be sure whether the word read is the one you have been seeking or, indeed, you may be sure that it is not. In this case you are asked to write a '–' after the word. Sometimes when the word read out is not the one you have been seeking, your actual target may come to mind. In this case, in addition to the minus sign in column 6, please write *your* actual target word in column 7.

"(6) Now we come to the column entries themselves. All columns should be filled out. When you are in a TOT state, words that are related to the target word in sound do almost always come to mind. This happens even when you are in a guess state. List them in column 4. In column 5 please mark whether the location of stress falls at the beginning, middle or end of the target word.

"(7) When you have finished all your entries, but before you signal us to read the intended target word, look again at the words you have listed as 'words of similar sound.' If possible rank these, as the instructions at the head of column 4 direct, in terms of the degree of their seeming resemblance to the target. This must be done without knowledge of what the target actually is.

"(8) The search procedure of a person in the TOT or 'don't know' state will sometimes serve to retrieve the missing word before he has finished filling in the columns and before we read out the word. When this happens please mark where it happens with the words 'got it' and do not provide any more data."

In the present report, only the results obtained for the explicit guesses of S's regarding first letter, last letter, and number of syllables will be reported. The location of stress data were too complex to analyze, since it turned out that in all target words employed the primary stress was on the first or second syllable only.

RESULTS AND DISCUSSION

The response of each S to each word presented was classified into 1 of 10 categories. A shorthand characterization of these appears in Table 1. The terms "know," "don't know," and "TOT" are defined in terms of the S's response in Column 1 of the response sheet. The terms "correct" or "incorrect" were applied according to whether or not the word supplied by S was identical or different from the word intended by E. The terms "intended" or "unintended" were derived from S's "+" or "–" mark in Column 6 of the response sheet. The term "got it" applies to trials in which Ss marked either TOT or "don't know" in Column 1 but then supplied a word before the correct word was read out by E.

Table 1
A Shorthand Characterization of the Substates and Their Codes

Code Number	Category
1	Know
2	Know–Incorrect
3	TOT–Intended
4	TOT–Unintended (4S, 4NS)*
5	TOT–"Got it"–Correct
6	TOT–"Got it"–Incorrect
7	Don't Know
8	Don't Know–"Got it"–Correct
9	Don't Know–"Got it"–Incorrect

**4S–S's target supplied; 4NS–S's target not supplied.*

TOT States

In this section we will concentrate on the five TOT states defined in Table 1. Note that whenever the word written down by S as the one he had been searching for was incorrect, the partial information provided by him can be judged either against his actual target or against E's target. This distinction is only applicable to States 4 and 6 of Table 1. In State 4, analysis of the S's responses against his actual target is possible only in instances where S actually supplies that word on the response sheet (4S).

Brown and McNeill's estimation of the amount of information available in a TOT state is based on analyses in which S's guesses are judged against the target indicated by him to be his effective target, whether or not it is identical with E's target. In terms of our classification, Brown and McNeill's estimates of correct detection in "positive TOT" is a composite of estimates obtained in States 3, 4S, 5, and 6, with E's target used as a criterion in States 3 and 5 and S's actual target as the criterion for States 4S and 6. In their study there were 360 instances (across words and Ss) where a TOT state was signaled. Of these, 233 were "positive." In the present study, 772 TOT states were signaled. Of these, there were 66 in State 3, 163 in State 4S, 43 in State 5, and 118 in State 6. State 3, which appears to be the most interesting TOT state, represents only 17% of all positive TOT responses. Table 2 shows estimates of the amount of information available to Ss in all TOT states. These data are based on the explicit guesses provided by Ss and are presented in terms of proportions of correct hits.

Table 2
Proportion of Correct Detection for Three Characteristics of the Target Word

State / Type of Information	Initial Letter S	Initial Letter E	Final Letter S	Final Letter E	Number of Syllables S	Number of Syllables E
3	.35		.47		.65	
4S	.84	.10	.78	.24	.88	.39
4NS		.11		.20		.37
5	.79		.53		.92	
6S	.71	.08	.69	.06	.76	.33
Positive TOT Brown & McNeill	.57				.57	
Positive TOT Present Study	.71		.69		.80	

Note–E = evaluated against E's target; S = evaluated against S's target.

The overall correct detection rates for "positive TOT" obtained in this study are slightly higher than those reported by Brown and McNeill. Examination of Table 2, however, reveals that the detection rates of the present study vary greatly depending on the particular substate and on the criterion against which S's guesses are evaluated. There are three generalizations which can be made on the basis of a cursory examination of the data presented in Table 2. First, in the case where the word supplied by S differs from the one intended by E, the S's guesses predict characteristics of the word declared by him to be his target considerably better than characteristics of E's target. This indicates that when E's target is used as a sole criterion, S's judgment of whether E's target was the "intended" one or not yields information on the predictive value of S's guesses. This effect resembles the "feeling of knowing" described by Hart (1964).

Second, a comparison of performance in State 3 to that in State 5 suggests that the correct detection rates are higher when recall is achieved before the end of the trial than when it is not. This finding replicates that obtained by Brown and McNeill (1966), and is interpreted by them as indicating that the nearer S is to his target, the more accurate is his generic recall.

Third, limiting ourselves to States 3 and 4S, we find that Ss predict consistently better their effective targets when these differ from the target intended by E (State 4S) than when they are identical with it (State 3). Two interpretations of this effect can be suggested. First, S in State 4S is "closer" to his effective target than S in State 3. This interpretation rests on the fact that, unlike State 3, State 4S represents a response where the memory search culminates in some product, albeit different from the one intended by E. In this sense, 4S is more akin to a "got it" state. A second interpretation is that State 4 might include many instances which do not represent a genuine TOT state. These are instances where the memory search does not focus upon a specific word but is guided by a vague, ill-defined schema of the solicited word. S's guesses in this case constitute, in a sense, steps along the search process itself. Once S has committed himself to a certain configuration of partial information at the point of providing an effective target, he tends to pick from the many words which come to mind one which fits this configuration. Thus, in a sense, the word supplied by S as his target is biased by the partial "guesses" already provided by him.

One clue to the mechanism involved in State 4S can be derived from the kind of incorrect responses supplied. The words supplied by Ss in State 4S were classified into three groups: (a) words that approximately fit the definition (e.g., junk, instead of sampan); (b) words which could be found in the dictionary other than those which may be classed in (a), and (c) words that were not actual English words. The second interpretation would predict that the "most accurate" partial information in State 4S will be obtained from Category c. The proportions of correct detection of first letters for the three types of supplied words are 77%, 86%, and 90%, respectively. For final letters, the respective rates are 75%, 79%, and 72%. Thus, although the order of the correct detection rates for the initial letters are in line with the second interpretation, the fact that even for acceptable incorrect responses the rate of detection is considerably higher than that obtained for State 3 (see Table 2) remains difficult to explain on the basis of this interpretation. Another observation which is also inconsistent with this interpretation is the fact that the detection rate for State 6 is not higher than that of State 5.

These findings lead to the interpretation that supplied incorrect words yield higher rates of detection simply because they are "nearer" as evidenced by the fact that they were recalled.

There is another interpretation, however. Since, in 4S, there is no control over what S might employ as his target, there exists the possibility that S's targets in 4S differ in some systematic way from E's targets. One hypothesis is that S targets are words of higher frequency than E's targets, thus being more "accessible" to S. To test this hypothesis, all S's targets which were provided in State 4 were paired with the respective ("correct") E's targets. Thirteen new Ss were asked which of the two words in each pair is more frequently encountered in the English language. There were 101 such pairs. Over all pairs and all Ss, S's targets were judged to be more frequent in 86.8% of the cases. Whether this observation by itself can account for the high rate of detection obtained with 4S is unclear, since we do not know whether accessibility of an item as reflected in its judged frequency affects detection rate even when proximity of the word to recall (as indicated, say, by retrieval latency) is controlled.

In summary, the various TOT states discussed in this section appear to be clearly distinguishable from one another, and although the reasons for these differences are not as yet clear, it would seem wise to analyze them separately rather than lumping them together to permit conclusions regarding a generalized TOT state. It should also be noted that, although the overall correct detection rates obtained for positive TOT are impressively high, they seem to be due mostly to TOT states in which S's actual target is "incorrect" (4S and 6), which constitute 72% of all positive TOTs. The more interesting State 3 in which the guessing process is probably less contaminated by intervening factors than the other TOT states yields correct detection rates which are far less dramatic.

Comparison of TOT States with the Don't Know State

In this section, more refined analyses will be employed to compare the amount of information available to Ss in the various TOT states to that available in the don't know state.

The proportions of correct hits obtained for the don't know state are as follows: .10 for first letters, .17 for final letters, and .38 for number of syllables. The correct detection rates observed for don't know are somewhat lower than those noted for State 3 and considerably lower than those obtained for 4S with S's target used as the criterion. Methodological difficulties (cf. Brown & McNeill, 1966) prevent a simple assessment of the significance of these findings. In what follows, we will attempt to explore the nature of these findings more closely.

First and Final Letters

One methodological note should precede analysis of the data on first and final letters. The measure used most often by Brown and McNeill to represent correct detection rate is the proportion of hits. This is perhaps the most straightforward descriptive index, and we have indeed used it in the previous section in comparing the various TOT states. It should be clear, however, that proportion of hits depends on two types of knowledge—first, knowledge concerning general characteristics of the *population* from which the input targets have been drawn, and second, knowledge concerning characteristics of the *specific* target in question. This distinction becomes crucial if implications regarding the structure of memory are to be drawn from TOT data, and it is particularly pertinent to the comparison of TOT states with the don't know state.

Consider the detection of first letters. The target words chosen by E represent a sample of the universe of "English words" or, rather, "uncommon English words." This universe defines a certain frequency distribution of first letters which is very unlikely to prove uniform (e.g., Mayzner & Tresselt, 1965). Ss' guesses of the first letter of the target word in the absence of any information about the word other than that it is an English word or an uncommon English word define a second distribution, one which reflects Ss' response biases. The proportion of hits depends, among other things, on the relationship between the two distributions. Thus, to the extent that Ss' guesses approximate the ecological distribution of first letters in the language (e.g., Attneave, 1959), the proportion of correct hits is likely to be higher than would be predicted from a simple chance model which assumes that all letters have equal likelihood of appearing in the input and in the output. Which is the appropriate chance model to choose depends, of course, on the hypothesis advanced. The hypothesis that Ss in a TOT state possess information regarding inaccessible *specific* memory entries presupposes *differential* detection and must be tested against a chance model which takes into account the correct detection rate expected on the basis of similarity in stimulus and response distributions alone.

In another study (Koriat & Lieblich, in preparation), we attempted to evaluate the degree to which guesses in a TOT situation approximate the probability of occurrence of various word characteristics in the population from which the target is drawn. In this study 44 Ss were asked to list 10 common (C) and 10 uncommon (UC) English words. Frequency distributions of initial and final letters were constructed for the words supplied. These distributions were found to match to a certain degree the distributions of first and last letters guessed by Ss in State 3 and don't know in the present study. It is interesting to note that the distribution of guessed first letters in the present experiment match better the distribution of first letters of UC words than that of C words. Thus, the frequency distribution of first letters provided by Ss in State 3 correlated .10 with the distribution of first letters of C words, but .63 with the distribution of first letters of UC words. The respective correlations for don't know are .47 and .79. The same trend obtained with regard to last letters. The high correlations observed with the UC distributions are partly a result of the fact that the actual target words employed are uncommon words. These correlations, however, remain high even when the effect of the distribution of initial and final letters in the list of targets employed is taken into account.

These results demonstrate the extent to which Ss guessing characteristics of a given target word are sensitive to the specific definition of the *population* from which the target is said to be drawn, and produce distributions which reflect the actual characteristics of this population.

Another way of evaluating the extent of correct detection in the present data which is due to information regarding population or class characteristics is as follows: If contingency tables of guessed-on actual letters are constructed for first and last letters, the proportion of responses expected to obtain in each of the diagonal cells can be calculated. The sum of these represents the proportion of hits expected to obtain on the basis of the relationship between the marginal input and output distributions. Using this procedure, the proportion of expected correct hits in positive TOT is found to be .153 for first letters and .262 for last letters. According to a naive chance model which assumes

Table 3
Actual First Letters and Guessed First Letters for State 3

Actual Letters	Guessed Letters A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
A	1																										1
C			3		1								1														5
E	1				3				2				2				1	1				1					11
M													1					1									2
N			3											1		1		1									6
O															2				1								3
S			2									1	1			1			5								10
U		1				1							1			1					2	2					8
V		1				1													1			1			1		5
Z					1								1			1		1									4
	2	2	8	0	5	2	0	0	2	0	0	1	7	1	2	4	1	4	7	0	2	4	0	0	1	0	55

uniform marginal distributions, the proportion of correct hits is expected to be only .038. As Brown and McNeill noted, the list of stimulus words employed is quite unrepresentative of English words in that it contains many words beginning with uncommon letters. It is therefore interesting that even with such a list the detection rate expected on the basis of the marginal distributions is considerably higher than that expected on the basis of the naive chance model.

In general, the analyses concerning class or population information did not yield striking results. Still they have one important methodological implication: the proportion of correct hits in a TOT study can vary greatly depending on the culling rule of the target words from the population and on the way this population is specified to the Ss.

The evaluation of differential detection requires, then, that marginal distributions be taken into account. One technique which permits such evaluation will be illustrated. Tables 3, 4, and 5 present contingencies of guessed-on actual first letters in States 3, 4S, and don't know. Observed frequencies in the diagonal cells were compared to frequencies expected on the basis of the marginals. In view of the dependencies of observations in our data, chi-square statistics are not appropriate to evaluate the difference between the expected and the observed frequencies. However, a binomial test was used to compare the number of diagonal cells in which the

Table 4
Actual First Letters and Guessed First Letters for State 4S

Actual Letters	Guessed Letters A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
A	13		1																								14
B		5																									5
C			10						1																		11
D	1			10																	1						12
E			1		7																						8
F						7																					7
G			1			1	3																				5
H								5								1											6
I									2							1						1					4
J										1																	1
K	1										2		1														4
L			1									3															4
M	1												5														6
N														3													3
O															1												1
P																5											5
Q																											0
R																		8									8
S								2											14								16
T			1																	5							6
U																					1						1
V																		1				5					6
W																							2				2
X																											0
Y																											0
Z																											0
	16	5	15	10	7	8	3	7	3	1	2	3	6	3	1	7	0	9	14	5	2	6	2	0	0	0	135

Table 5
Actual First Letters and Guessed First Letters for Don't Know

AL*	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
	Guessed Letters																										
A	15	17	18	7	3	2	1	2	1	1	4	8	7	2	4	10	0	13	19	12	1	3	2	1	0	1	154
C	7	14	28	5	3	2	6	8	3	1	3	5	11	3	1	8	1	21	46	8	6	0	0	0	0	0	190
E	21	3	10	6	10	5	0	3	6	1	0	0	5	6	2	11	0	13	17	2	0	2	1	0	0	0	124
M	0	4	2	1	1	2	0	6	1	0	0	1	5	2	0	0	0	1	7	1	0	1	1	0	0	0	36
N	10	3	13	4	2	3	2	1	2	0	1	7	10	9	1	8	0	6	16	8	0	2	1	0	1	0	110
O	2	1	1	0	1	3	3	1	2	0	0	0	3	1	1	2	0	3	5	2	2	0	0	0	0	0	33
Q	0	2	0	2	0	0	0	1	0	0	0	0	1	0	0	1	0	2	2	0	0	0	0	0	0	0	11
S	10	9	23	6	4	13	5	7	0	0	2	11	22	5	2	33	0	15	38	14	1	2	2	1	1	0	226
U	3	7	15	2	1	1	5	6	2	1	0	4	9	0	1	7	1	5	7	0	3	1	0	0	1	1	83
V	6	4	10	1	1	7	5	6	2	1	0	9	12	3	2	17	0	13	10	5	2	5	2	0	4	1	128
W	2	7	6	3	0	4	0	2	1	1	1	1	0	1	1	4	0	2	8	4	0	4	3	0	0	0	55
Y	2	1	5	0	0	1	0	0	0	0	0	1	4	0	0	4	0	1	4	2	0	2	0	0	0	0	27
Z	4	6	2	1	1	2	0	5	1	1	1	3	0	1	1	1	0	2	7	1	0	0	0	0	0	0	40
	82	78	133	38	27	45	27	48	21	7	12	50	89	33	16	106	2	97	186	59	15	22	12	2	7	3	1217

AI = actual letters

observed frequency exceeded that expected (0 > E) to the number of cells in which the situation was reversed (E > 0). The ratios of 0 > E to E > 0 cells (ignoring cells where E = 0) were as follows: 8:1 for State 3; 22:0 for State 4S; 6:0 for State 5; 14:1 for State 6; 23:0 for "positive TOT"; and 10:3 for don't know. In all TOT states as well as in the don't know state, the ratios obtained were significantly different from chance at the .05 level. A more refined examination of contingency tables such as those presented above might reveal sources of dependence other than those reflected in the diagonals. These analyses are beyond the scope of the present paper.

Contingency tables were also constructed for final letters. The ratios of 0 > E diagonal cells to E > 0 cells were as follows: 7:2 for State 3; 14:0 for State 4S; 5:0 for State 5; 13:1 for State 6; 17:2 for "positive TOT"; and 11:3 for don't know. The ratio obtained for State 3 is significantly different from chance at the .10 level. All other ratios including that obtained for the don't know state are significant at the .05 level.

In general, these analyses seem to suggest that part of the information detection demonstrated for TOT states and the don't know states appears to be based solely on general information regarding the probability of occurrence of certain characteristics in the population from which the target in question has been drawn. However, over and above the detection accounted for by population information there also exists detection of characteristics specific to the solicited missing target. Differential detection was demonstrated for all positive TOT states, but, more surprisingly, it was shown to obtain in the don't know state as well.

Number of Syllables

Contingency tables of the guessed number of syllables on the actual number of syllables in Ss' target were constructed for all TOT states, for the composite TOT, and for the don't know state. Four of these contingency tables are presented in Table 3.

Examination of the contingency tables shows that correct guesses of number of syllables can be partly accounted for in terms of population knowledge, i.e., in terms of the match between input and output distributions of numbers of syllables. Thus, in all positive TOT states and in the don't know state, the proportion of hits expected on the basis of the marginal distributions is .32 or more, compared to .20 or .25 which would be expected on the basis of the naive chance model.

With regard to differential detection, Brown and McNeill's contention that Ss in a TOT state can guess the number of syllables in the target with significant success is based on their finding of a rank correlation of 1.00 ($p < .05$) between the means of Ss' guesses and the actual number of syllables. Use of this procedure with the present data yields a rank correlation of 1.00 for all positive TOT states, as well as for the composite. However, a correlation of 1.00 ($p > .05$) was also obtained for the don't know state. On the basis of this finding alone, we must contend that the information available about the number of syllables in a target which is on the tip of the tongue does not exceed the information available regarding a completely inaccessible target. An examination of the contingency tables, however, does not seem to support such a contention,

Table 6
Actual Numbers of Syllables (A) and Guessed Numbers of Syllables (G) for State 3, State 4S, Positive TOT, and Don't Know

A\G	1	2	3	4	5	Mean
			State 3			
1	5	4	1	0	0	1.60
2	0	18	7	2	0	2.40
3	0	3	15	3	0	3.00
4	0	1	2	4	0	3.42
			Don't Know			
1	58	128	44	7	0	2.00
2	82	301	171	25	2	2.24
3	41	236	158	28	4	2.39
4	12	42	41	13	3	2.57
			State 4S			
1	19	2	0	0	0	1.09
2	0	66	0	1	0	2.02
3	0	6	29	2	1	2.94
4	0	0	3	5	0	3.64
5	0	0	0	1	0	4.00
			Positive TOT			
1	37	9	4	0	0	1.34
2	0	114	8	4	0	2.12
3	0	13	66	5	1	2.92
4	0	1	7	13	0	3.57
5	0	0	1	1	0	3.50

since the amount of variance of the guessed number of syllables accounted for by the actual number of syllables appears to be consistently higher (though it is hard to evaluate whether it is significantly so) for the various positive TOT states than for the don't know state. The Pearson correlations obtained between guessed and actual numbers of syllables are as follows: .65 for State 3; .88 for State 4S; .88 for State 5; .74 for State 6; and .79 for composite positive TOT. The correlation obtained for don't know is .19. Thus, although State 3 yields the lowest correlation from among the positive TOT states, the correlation obtained for don't know is considerably lower. On the basis of these data, it appears reasonable to conclude that some information regarding the number of syllables is available even in a don't know state, but that correct detection is considerably better in TOT states.

It might be instructive to note one feature of the data. In the positive TOT states, but not in the don't know state, there is a tendency for the prediction of guessed from actual numbers of syllables to be better than the prediction of the latter from the former. This observation might point to directionality in the process of retrieval in a TOT state and deserves further investigation.

CONCLUSIONS

This report was intended primarily to illustrate the importance of some theoretical and methodological considerations pertaining to the study of the TOT phenomenon. The analyses presented suggest that "positive TOT," as defined by Brown and McNeill, comprises a variety of substates which are distinguishable in terms of rate of correct detection. Further research is needed to clarify the nature of these substates.

Generic recall assumed to characterize the unique TOT state was obtained in the don't know state as well, although to a lesser extent. This finding may be taken to imply that Brown and McNeill's attempt to draw from the fact of generic recall conclusions regarding the manner in which specific memory entries are stored in a "mental dictionary" and retrieved from it is somewhat premature. These same findings, however, might also be taken to suggest that the observations pertaining to the TOT phenomenon should be examined within a broader conception of memory, a conception which gives due regard to those features of memory which cannot be adequately represented in a mental dictionary model.

We have suggested a distinction between detection based on information concerning the population of potential targets and detection based on information regarding the specific target in question. The potential usefulness of this distinction has been illustrated, and we believe that subsequent work on detection of partial information in memory should take great care in separating the two sources of correct detection if meaningful conclusions are to be drawn from the data.

We can offer at this point no adequate model to account for the findings as a whole. The most interesting observation is probably that of differential detection in the don't know state. A tentative model which seems to account for this observation assumes that, in the don't know state, the individual utilizes information regarding correlations between content (semantic) and formal (phonemic) aspects of words. On the basis of such information one can bet, for example, that the first name of a person unknown to him contains fewer syllables than an unknown medical term. When asked to provide partial information regarding an unknown word, S attempts to utilize as much of the information available to him ("English word," "uncommon," "Southeast Asia," etc.) to arrive at a constellation of likely formal characteristics of the target in question. The degree to which he can offer correct information regarding the unknown target depends on the extent to which he was able to delimit as narrow a class as possible which is associated with a unique distribution of word characteristics and on the extent to which the intended target is representative of the class of targets so delimited. Thus, if the specific target is not representative of the class, S's guesses are expected to be more predictive of other members of the class than of the solicited word. It should be noted that in this model, the distinction between population detection and differential detection becomes a matter of degree.

The basic assumption underlying this model is the assumption that semantic and formal features of words are correlated. The only observation we can report which supports this assumption concerns detection in States 4S and 6. In these states S's target differs from E's target. According to the model presented above, it could be expected (a) that the two targets share certain formal characteristics, and (b) that S's guesses regarding his actual target will be predictive at least to some degree of formal features of E's target as well. The relationship between number of syllables guessed and number of syllables in *E's target* was examined for States 4NS, 4S, and 6. For State 4NS, the means of numbers of syllables guessed when E's target contained one, two, three, and four syllables were 2.02, 2.47, 2.55, and 2.72, respectively. For State 4S, the respective means were 1.83, 2.23, 2.51, and 2.50, and for State 6 they were 2.00, 2.36, 2.38, and 2.50. Thus, it appears that S's guesses reveal differential detection of features of E's target even when this target is not the one intended by S. This observation is particularly surprising in view of the fact that S's guesses in States 4S and 6 display considerably high correlations with the actual features of S's target.

We are not sure that the model outlined above can account for correct detection in the TOT state. If it could, it would mean that the TOT state differs from the don't know state only in degree and that the generic recall obtained in the TOT state is also based on detection of class characteristics. A more reasonable hypothesis which we are willing to advance is that, in the normal retrieval process of a word which is not readily accessible to recall, the ability to make initial bets regarding formal features of the solicited word on the basis of information concerning class characteristics aids in narrowing the search for the missing word and in "priming" it when it is indeed available in memory store.

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NOTES

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