

Information and cue-priming effects on tip-of-the-tongue states

Psycholinguistics 2

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Introduction

Tip-of-the-tongue (TOT) states are the subjective feeling that recall of an item is imminent (Schwartz and Smith, 1997). Schwartz and Smith (1997) were interested in the subjective experience of being in a TOT state and not the memory retrieval processes involved. There was a lack of research on the subjectivity of TOT states and so Schwartz and Smith's (1997) hypotheses were taken from recent research on feeling-of-knowing judgements. They felt this was justified, with reference to other research, due to the similarities between TOT states and feeling-of-knowing judgements. Much of the research on feeling-of-knowing judgements referred to was concerned with how the amount of information given in conjunction with the target affected feeling-of-knowing judgements. Schwartz and Smith (1997) note that feeling-of-knowing judgements usually ask participants whether they think they will recognise an item, while TOT states result from the subjective feeling that recall is imminent.

Koriat (cited in Schwartz and Smith, 1997) suggested that TOT states resulted from any information recovered while searching for an item and that it was unimportant if the information was related or unrelated to the target. Partial information of the target that was recovered also contributed to TOT states being reported and in the context of Schwartz and Smith (1997) and this research, partial information would refer to incomplete retrieval of the word. In Koriat's theory, a TOT state is more likely to be experienced if more partial or related information is recovered (Schwartz and Smith, 1997). Data from previous research showed that TOT states may be accompanied by retrieved partial information but not that TOT states were caused by recovered partial information (Schwartz and Smith, 1997).

Schwartz and Smith (1997) used the TOTimal method which presents participants with imaginary animals (referred to as TOTimals) and requires them to learn the names and biographies of them. The participants are presented with a picture of the TOTimal alongside its name, country, size and diet. At the testing stage participants are requested to recall the name of the TOTimal from a cue, which could be any of the other information presented. In Schwartz and Smith's experiment (1997) the *country* was given as a cue for recall and the same method was used in this experiment.

Schwartz and Smith (1997) and the current experiment test how the amount of related information presented to participants with TOTimals effect the rate of TOT states. With TOT states as the dependent measure¹, three within-subject conditions were compared: minimum, medium and maximum information. In the minimum condition the TOTimal name (e.g. Tawdosk) was presented alongside the country where it is found (e.g. Russia) no picture of the TOTimal was presented. In the medium condition participants were presented with a picture of the TOTimal along with the name and country. Participants were presented with the size and diet of the TOTimal in addition to the name, country and picture in the maximum condition. Schwartz and Smith (1997) hypothesised, on the basis of Koriat's theory of increased TOT states in conjunction with more information reported, that more information presented at the learning stage would lead to increased TOT rates. After the results of Experiment 1 (Schwartz and Smith, 1997); which found no difference between the medium and maximum condition, this hypothesis was adjusted to suggest that some information is more important than others, in the current context; pictures being the most important. Schwartz and Smith (1997) found that the medium and maximum condition resulted in more TOT states.

Schwartz and Smith (1997), in Experiment 2 investigated the priming effects on the country cues as previous research had found that cue familiarity had an effect on TOT states. This experiment only featured the minimum and medium information conditions. It was shown that cue priming did not result in a higher number of TOT states than for the unprimed condition, yet there was a significant interaction of the two

¹ In Schwartz and Smith (1997) the dependent measures of percent recalled, percent reported TOT states, recall of the first letter and a recognition measure were used.

conditions: information given and priming. In Experiment 3, Schwartz and Smith (1997) included all three conditions and priming, which replicated the results of Experiments 1 and 2.

The current experiment was designed to replicate Schwartz and Smith's Experiment 3 (1997). In this fashion one dependent measure of TOT state was tested, with three within-subject conditions: minimum, medium and maximum information. Cue priming was also investigated; the cue at the testing stage was *country*. From Schwartz and Smith's (1997) research the hypothesis was formulated that TOT rates would be effected by the amount of information presented to participants, with the picture-included conditions resulting in higher TOT rates than the minimum condition. Also the cue priming of country would result in the TOT rate being affected in the interaction with condition.

Pilot Experiment

As the intention was to partially replicate Schwartz and Smith (1997) a full pilot was not required, yet it was necessary to verify that the materials designed for the replication would allow TOT states to be subjectively realised by the participants. It was important to achieve similar ratios of TOT states to that of Schwartz and Smith (1997) at just over 1.5 per participant. To achieve full verification of this average of TOT states at 1.5 per participant was beyond the scope of this research so it was decided that one participant would be tested for each data set (see Experiment Design below). If these three pilot participants identified themselves as being in a TOT state one or more times (but not more than three) it would be assumed that the material design was adequate to achieve comparable results to those found by Schwartz and Smith (1997).

The materials were designed following the descriptions that Schwartz and Smith (1997) gave as closely as possible. As the materials were unique to this experiment and the aim was to produce an experiment that could be compared fairly to Schwartz and Smith's (1997) this had to be done systematically, with all the TOTimal pictures and the written question sheets being as clear, understandable and uniform as possible. The TOTimal presentation sheets, the recall test and priming sheets were all designed before conducting the pilot experiment (for a full description of the materials see Experiment Design below).

Throughout the material design stage there was a continuous evaluation process through constant attention to the reliability and control of the materials. Before the pilot stage had been reached there had already been many alterations to the design of the materials in terms of layout and presentation and it was felt that the TOTimal presentation sheets (Appendix 1), the recall test sheet (Appendix 2) and priming sheet (Appendix 3) were satisfactory, yet feedback was to be gathered from the participants and modifications would be made, if and where the experimenters felt necessary.

The TOTimal pictures were initially sourced from Google TM Image Search and were presented as colour images. The images were resized to fit inside a 158x165mm presentation box on A4 paper. However, it was concluded that the colour images were not uniform enough to prevent bias to particular images, so these images were then traced to produce black and white line drawings. The country cues in the recall test were initially presented in the same order as the learning presentation of subset A (see Experiment Design below) and this was altered and the country cues were randomised to increase the reliability of the data collected. The six primed countries were the first six countries listed on the priming sheet as it was thought that this would achieve the greatest priming effect.

For the procedure, it was decided that each TOTimal would be presented three times on A4 paper, controlled manually by the experimenter for the same time lengths as Schwartz and Smith (1997) had done in Experiment 3 (1x 10 s, subsequently 2x 5 s). The priming sheet and the recall test would be self-timed, as in Schwartz and Smith (1997). Two participants were primed and one not to check the procedure in both conditions. The three participants were all undergraduate students enrolled on the same psycholinguistic module.

Pilot Results

The results of the pilot experiment are shown in Table 1.

Data Set (1 participant per set)	Information		
	Minimum	Medium	Maximum
1	2	0	1
2	0	0	1

Table 1: Number of TOT states reported by participants in pilot experiment.

Pilot Discussion

The number of TOT states reported by participants seemed to indicate that the material design had been adequate to produce results that would be comparable to Schwartz and Smith's (1997). The presentation and layout of the materials was felt to be satisfactory by the participants and these were not further modified.

Three procedural amendments were made resulting from the feedback received by the participants and the observations of the experimenters:

1) The TOTimal presentation sheets were initially presented on 1 sheet of A4 paper and participants commented that they were experiencing interference from subsequent TOTimal pictures that could be seen through the paper. Presentation sheets were then backed to prevent interference for the full experiment.

2) During one TOTimal presentation the experimenter dropped the presentation sheets and it was found that this was less likely to occur if a table was leant on and so this was to be ensured during experimentation.²

3) The three participants all expressed confusion as to how the recall test should be carried out and it was decided to ensure that this was explained more satisfactorily and an instruction sheet was produced for the experimenters.³

Experiment

After the modifications following the pilot experiment the experiment was conducted as outlined below. The experiment was carried out by three different researchers in various locations. The hypothesis remained the same as at the pre-pilot stage; that TOT rates would be higher in the medium and maximum condition and that cue priming would have an effect.

Participants

The 60 participants were volunteers and of this 60, 53 were drawn from the social circles of the experimenters and 7 were first year undergraduates on the BA English Language and Communication at King's College London. The participants were aged 18-69. Demographic factors were not controlled for but 27 were undergraduates, 14 were graduates and 19 had never attended university so the sample was

² One experimenter chose to fasten the TOTimal presentation sheets together in a flip-chart like fashion.

³ The experiment was to be conducted by the three experimenters separately, each collecting sample data from twenty participants each.

relatively representative. The experiment was run with individual participants or in groups of up to 5 participants, dependent on the availability of the participants. The participants in Schwartz and Smith (1997) were all undergraduates and it was felt that this was not a major concern in terms of comparability with their research. It was also felt that the broader demographic present in this study would be more representative.

Materials

Twelve TOTimals were used (see Fig 1). The TOTimals were all line drawings of imaginary animals, as discussed above. These pictures were paired randomly with a two-syllable name, taken from the ARC Nonword Database (except Yelkey and Rittle which were borrowed from Schwartz and Smith, 1997), each with a unique first letter, comprising 5-9 letters. While the names were randomly allocated to pictures they were controlled for possible links between word and picture e.g. *Temroo* was not coupled with the TOTimal picture that had kangaroo-like legs. Each TOTimal was also assigned a country name, allocated at random, with diet information controlled so that it was possible with that country, size of animal was allocated on common-sense judgements. Countries, size and diet were all unique. The pictures and descriptions were created to have resemblance to real animals so as to make them easier to learn. Schwartz and Smith (1997) had created their TOTimal names to resemble animal names to facilitate learning; this was achieved in this experiment by the selection of nonwords from the ARC Nonword Database.

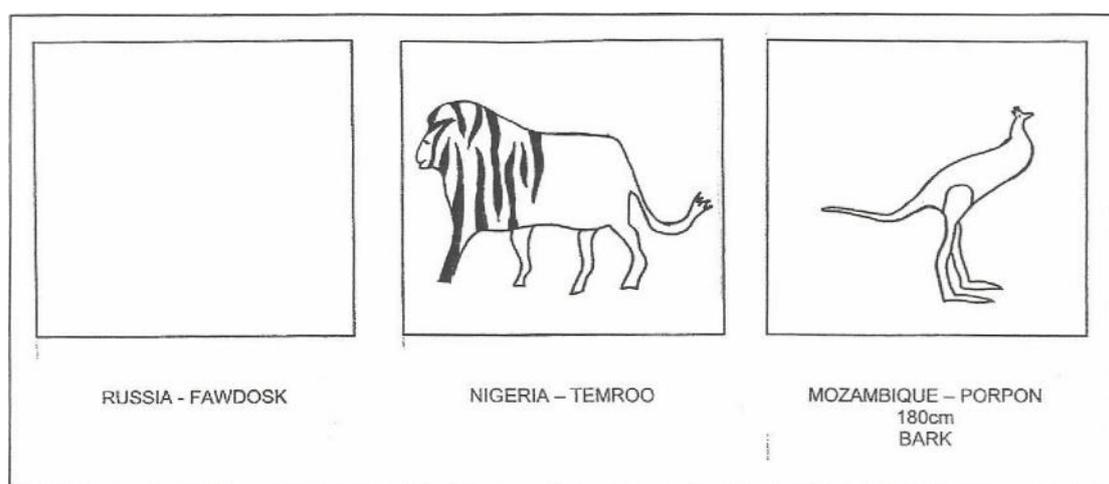


Figure 1: TOTimals in the minimum, medium and maximum condition

Design

2x2 within-subject independent variables were controlled- the amount of information provided at the presentation stage and cue priming. The amount of information was divided in to three levels; minimum information (country only), medium information (country and picture) and maximum information (country, picture, size and diet). There were two levels of priming: cue-primed and unprimed. One dependent measure was observed: TOT rates.

The stimuli were counter-balanced across conditions: the names and countries were divided in to three data sets of four stimuli (1, 2 and 3). These data sets were then each sub-divided into A and B which contained the same TOTimals in the same conditions, but were presented to participants in a different order. For this purpose, the participants were divided into six groups of ten participants. Each TOTimal appeared in all possible combinations of experimental conditions e.g. 'China — Yelkey' in one counter-balancing condition alone, in another condition with its picture and in another condition with picture, size and diet. Country-Totimal pairs remained the same throughout and remained with the same picture, size and diet. Each

participant saw four TOTimals in the minimum information condition, four TOTimals in the medium information condition and four TOTimals in the maximum information condition. Table 2 shows how the stimuli were counterbalanced:

Data Set	TOTimals		
	1,2,3,4	5,6,7,8	9,10,11,12
1A	MAX 1-4	MED 5-8	MIN 9-12
2A	MIN 1-4	MAX 5-8	MED 9-12
3A	MED 1-4	MIN 5-8	MAX 9-12
1 B	MAX 4-1	MED 8-5	MIN 12-9
2B	MIN 4-1	MAX 8-5	MED 12-9
3B	MED 4-1	MIN 8-5	MAX 12-9

Table 2: the counter-balancing of the stimuli in the experiment.

Further to this, of the ten participants presented with each subset, five received the priming sheet and five did not. In this manner the priming effect was also counter-balanced.

A TOT judgement was defined as a TOT judgement having been reported by the participant and found to be a 'correct' TOT state. A 'correct' TOT state was defined as either correct 1st letter reported, correct phonological feature (e.g. participant had written 'sounds like...' or an element of the TOTimal name reported was phonologically similar to the actual TOTimal name) or number of syllables for the TOTimal corresponding to the country cue. Number of syllables was included as a criterion of 'correct' TOT state as although all TOTimal names were two-syllable, there were incidences of one-syllable or three-syllable TOTimal names reported as TOT states. If participants had reported a TOT state and then not given any more information, or had the 1st letter, number of syllables or phonological features incorrect, this was not included as a TOT state⁴.

It was felt that this definition of TOT state was useful in the experiment because a TOT state is a subjective judgement and it was felt that it would be beneficial in the current research to assess whether 'correct' TOT states would alter the results in any way. In Koriat's theory (in Schwartz and Smith, 1997) more correct than incorrect information is reported in tasks requiring metamemory judgements and so TOT states are usually accurate. Schwartz and Smith (1997) did not look at accuracy within the condition of TOT states. However, Schwartz and Smith (1997) used the recognition test to test the accuracy of TOT states and found that recognition rates increased when TOT states were reported. For these reasons it was felt that the definition of TOT state used in the current experiment was comparable to Schwartz and Smith (1997) and a recognition test was not used.

Procedure

There were three phases to the experiment: priming, presentation and testing. The participants that were being primed for country cues were initially given the priming sheet which was a list of 24 countries. Of these countries six of the twelve countries assigned to the TOTimals were featured, with the other eighteen having been chosen at random. The six primed countries appeared first on the list as it was felt this would give the greatest priming effect. Participants were asked to rate the countries as a holiday destination on a 1-5 scale (1 being undesirable, 5 being desirable). This part of the experiment was self-paced. If the experiment was being conducted in a group (see Participants above) the presentation of TOTimals began when all members had completed the priming sheet.

⁴ The TOT states in the pilot experiment were also defined in this manner.

The presentation of TOTimals began as soon as the priming sheet had been completed, or as soon as all participants were focused if not being primed. Prior to the presentation of TOTimals, participants were explicitly told that they would later be given the country names to recall the names of the TOTimals from. Before the presentation stage TOT states were not explained or discussed. Each TOTimal was presented three times: the first time for 10 s and the second and third time for 5 s. The country, name, size and appearance (when given) were read aloud by the experimenter and the presentation order was the same all three times for each participant. The TOTimals were presented on A4 paper inside a 158x165mm presentation box; if the TOTimal was in the minimum condition an empty box was shown. The country, TOTimal name and diet and size (if given) were presented in Arial font, size 28 and centred, beneath the presentation box.

Directly after the presentation session participants were handed the recall test sheet. This featured twelve sets of questions, one for each TOTimal. The countries were given as cues for the participant to recall the TOTimal names, the country cues were presented in a different, randomized order from the order that the TOTimals appeared in at the presentation stage. Participants did not see the TOTimal pictures during the testing phase. At the beginning of the recall test participants were given written instructions defining what a TOT state was. The definition that participants saw was taken from Brown and McNeil, cited in Schwartz and Smith and was directly quoted: 'you are unable to think of the word but feel sure that you know it and you feel sure it is on the verge of coming back to you'(1997: 68). Following the recommendations of the pilot experiment, the experimenter then went through the example question with participants and asked if further clarification was needed. It was highlighted in the written instructions that it was important for the experimenters to know if the participant was experiencing a TOT state.

For each country cue in the recall test the participant was asked initially to recall the name of the TOTimal associated with that country. If the name could not be recalled they were then asked if they were experiencing a tip-of-the-tongue state and if so, to give any details of the TOT state that they could (e.g. first letter). If the participant could neither recall the name, nor was experiencing a TOT state, they were asked to guess at the first letter of the TOTimal. Participants were also asked to report any additional information they could remember about the TOTimal (diet, size and appearance) as this should facilitate an increased chance of TOT states being reported, based on the assumptions of Koriat's theory (Schwartz and Smith, 1997). While Schwartz and Smith (1997) found more TOT states in the medium and maximum condition they found there was only an increase in appearance reported in conjunction with TOT states, it was therefore felt unnecessary to investigate the additional information reported. When explaining the example question to the participants it was highlighted that it was important that they gave an answer for each question and that if they could not recall the name and were not experiencing a TOT state to ensure that they took a guess at the first letter. This phase of the experiment was also self-paced.

Results

Responses on the recall test in percentages were: 16.1% were TOT states, 2.9% of responses a TOT was not reported but the correct first letter was given, 13.5% correct recall and 67.5% were no recall, no TOT state and no correct first letter which were grouped together. The highest number of TOT states were reported in the medium information condition, with the lowest number of TOT states reported in the maximum condition (see Fig 2).

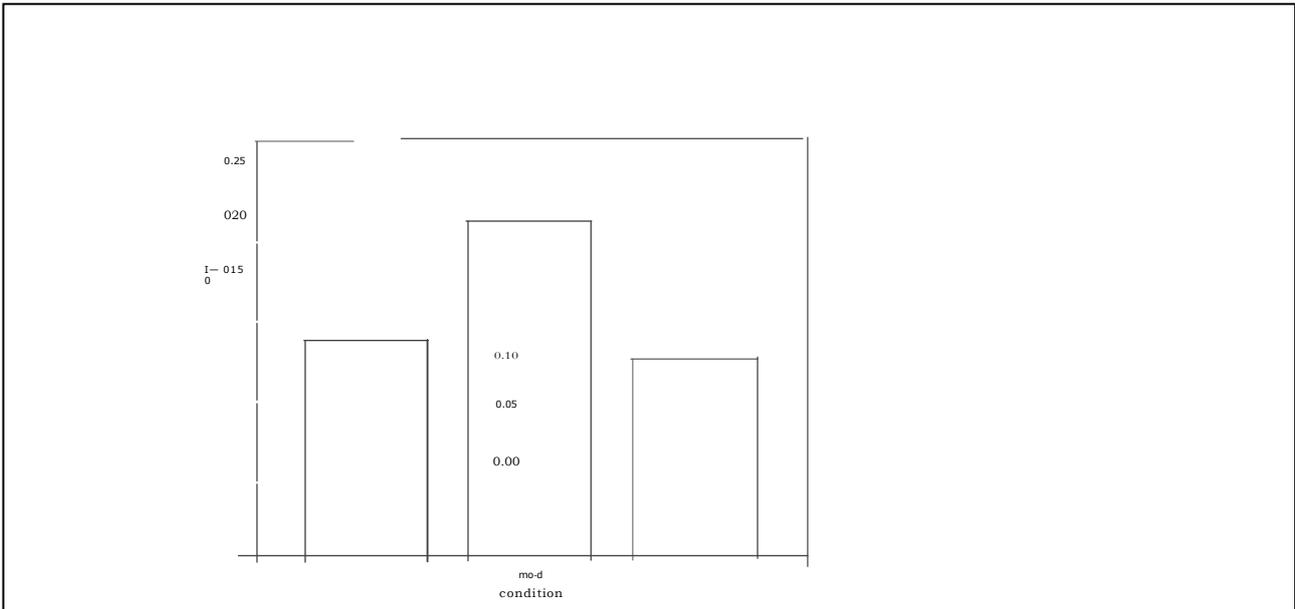


Figure 2- TOT rates in the minimum, medium and maximum condition

A two-way ANOVA was carried out to test for the effect of condition and prime across groups. There was a significant effect of condition ($p = .031$) and prime ($p = .013$) but there was no interaction of the two. A one-way ANOVA was then carried out which showed a significant effect between groups ($p = .018$). In multiple comparison post-hoc tests (Tukey HSD, Scheffe and Bonferroni) it was found that there was a significant difference between the medium and maximum conditions ($p = .023^5$) and while not significant there was a trend of difference between minimum and medium condition ($p = .062$).

Looking at the descriptive data for TOT states that were reported it became clear that certain TOTimal names had produced more TOT states (see Fig 3). A linear regression was conducted. There was a significant effect of word on TOT states reported ($p = .005$) but there was no significant effect of word and condition ($p = .707$) or word, condition and prime ($p = .210$).

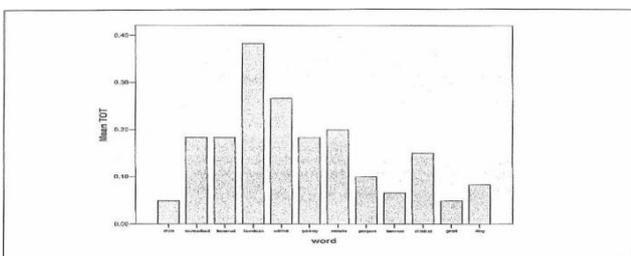


Figure 3- TOT rates with individual words

⁵ p values in post-hoc tests given from Tukey HSD.

Discussion

The most TOT states were reported in the medium condition, with there being a significant difference from the maximum condition and an almost significant difference from the minimum condition. This, to an extent, supports Schwartz and Smith's (1997) findings and the hypothesis for this experiment that more TOT states would be reported in the medium and maximum conditions due to picture information at encoding being the most important information to increase TOT rates. What is not explained, is why there were the least TOT states reported in the maximum condition. Some participants reported that the additional information was distracting and it could be the case that there was an information overload. This does not conform to Koriat's theory and Schwartz and Smith's (1997) findings and more research would need to be carried out to validate these findings. The broader demographic used in this experiment may also have had an effect and again further research would be needed to investigate. What this result does show is that amount of information at the presentation stage does have an effect on TOT rates and could suggest even further that pictorial information is the most significant and that any additional information actually leads to decreased rates.

There was not a significant interaction of prime and condition as found by Schwartz and Smith (1997) and hypothesised here and the reduced numbers of TOT states in the maximum condition could be the cause of this. What was found is that cue prime had a significant effect on TOT states, unlike in Schwartz and Smith (1997), which only found priming to have an effect in the interaction with condition. One possible cause for this is that Schwartz and Smith (1997) do not specify the order of their priming sheet but in the priming sheet used in this experiment, the countries were specifically placed at the beginning in the hope that this would lead to the greatest priming effect. If indeed, it is the case, that the order of cue-priming is linked to the priming effect of reported TOT states, this is one possible explanation for the significant effect of priming found in this experiment.

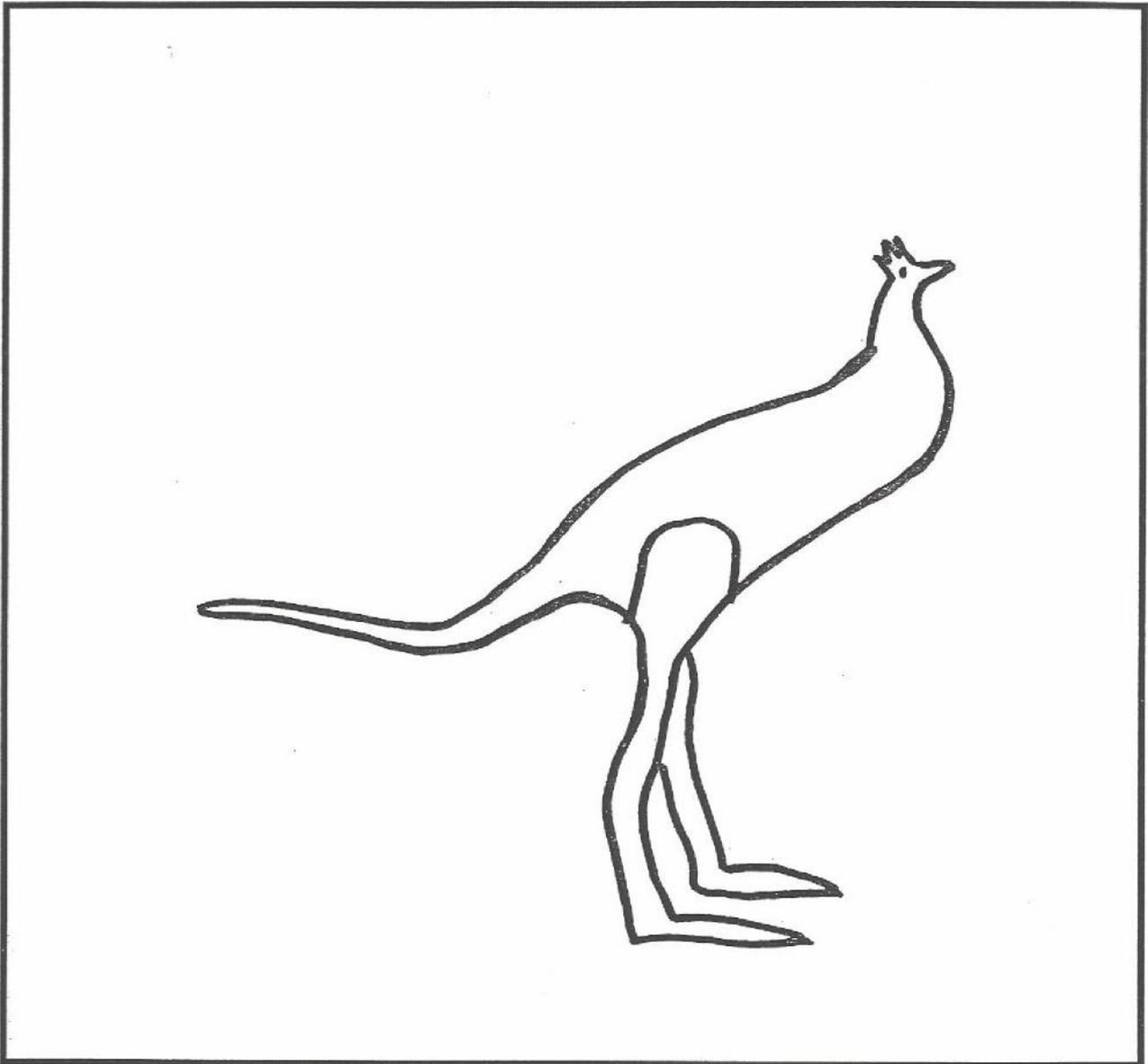
That there was a significant effect of name on TOT rates has been tested for effect through the linear regression conducted, which found no effect of name and condition or name, condition and prime. In future research it is suggested that these conditions are counter-balanced.

Bibliography

Schwartz, B.L. and Smith, S.M. (1997) 'The Retrieval of Related Information Influences Tip-of-the-Tongue States', *Journal of Memory and Language*, 36: 68-86

Appendix 1

Example Presentation Sheet (maximum condition)



MOZAMBIQUE — PORPON

180 cm

B A R K

Appendix 2

Recall Test Sheet (1st page: instructions and example question)

You are required to recall the name and as much information as you can about the imaginary animals that you have been shown, based on the country name given.

When trying to recall the information you may experience a tip-of-the-tongue state. This is when you are unable to think of the word but feel sure that you know it and that you feel sure it is on the verge of coming back to you.

It is important for us to know if this is happening. Please tick 'YES' or 'NO' as appropriate and then follow the instructions.

Please answer every question. *Example:*

A) UNITED STATES

1. Name of Animal.....

If you CAN recall the name of the animal go straight to 3., if you CANNOT go to 2.

2. Are you experiencing a tip-of-the-tongue state? YES NO

a) If 'YES' please indicate any information about the name of the animal that you can recall (e.g. first letter, no. of syllables)

b) If 'NO' please guess the first letter of the

3. Can you remember any other information? If you were not given the information please tick the box.

Size NOT GIVEN 1=1

Diet..... NOT GIVEN

Appearance NOT GIVEN

Appendix 3

Priming Sheet

Below are 24 countries. Please judge which of these countries would make nice places to go on holiday.

Rate them **1 — 5** (1= Not desirable; 5= Desirable)

Example:

A)	UNITED STATES	1	2	3	<input type="text" value="4"/>	5
		Please begin.				
1)	FIJI	1	2	3	4	5
2)	INDONESIA	1	2	3	4	5
3)	TUNISIA	1	2	3	4	5
4)	RUSSIA	1	2	3	4	5
5)	IRELAND	1	2	3	4	5
6)	CHINA	1	2	3	4	5
7)	BELGIUM	1	2	3	4	5
8)	DENMARK	1	2	3	4	5
9)	NORWAY	1	2	3	4	5
10)	SLOVAKIA	1	2	3	4	5
11)	IRAN	1	2	3	4	5
12)	VIETNAM	1	2	3	4	5
13)	PAKISTAN	1	2	3	4	5
14)	CANADA	1	2	3	4	5
15)	GRENADA	1	2	3	4	5
16)	JAMAICA	1	2	3	4	5
17)	ITALY	1	2	3	4	5
18)	LEBANON	1	2	3	4	5
19)	YEMEN	1	2	3	4	5
20)	HUNGARY	1	2	3	4	5
21)	THAILAND	1	2	3	4	5
22)	ETHIOPIA	1	2	3	4	5
23)	CHAD	1	2	3	4	5
24)	ARGENTINA	1	2	3	4	5