4.1 Psychologists, like philosophers had been interested in language and meaning, though their concerns were not the same as that of the linguists.

However, the anti-mentalism of the 1930s affected psychology much in the same manner as it did linguistics. There was a similar stress on accounting for only observable phenomena that did not rely on any degree of speculation. This trend in psychology resulted in the rejection of language as a topic for behavioral studies.

There was a renewal of interest in language in the early 1950s due to a number of reasons. The involvement of psychologists in communications during the World War II, the development of the Mathematical Model of communication, and the emergence of computers all served to rekindle an interest in language among psychologists.

Psychologists and linguists discovered common areas of interest like verbal learning, association, language acquisition, speech pathology, etc. There also existed, in both disciplines, a parallel distrust of the study of meaning.
It was this era which gave rise to "psycholinguistics", as a discipline.

Psychological theories of language which constituted a major influence on psycholinguists were the Information Theory, the Learning Theory and the Associative Chain Theory.

What was significantly common to all these theories was an attempt to account for linguistic behaviour. Also there was no attempt to account for linguistic intuition, or any aspect of language that may rely on speculation. These psycholinguistic theories tried to account for linguistic behaviour in strictly observational terms. Psychologists had developed procedures for observational data which were applied to linguistic phenomena.

The Information Theory model was based on the conception of language as a chain of events. Each event was assigned "conditional probability of occurrence".

The Learning Theory was based on Stimulus-Response connections. Verbal behaviour was conceived
of as merely verbal responses, which were a sub-class of responses in general. The controversies within this theory were based on differences of opinion concerning the degree of complexity between the Stimulus-Response connections.

The Mediation Theory as developed by Osgood, Suci and Tannenbaum is significant as it is the first major attempt to quantify meaning. Since psychology and psycholinguists had concentrated on observational data and variables that could be subjected to a quantitative measurement, the study of meaning had been avoided. According to the mediational view of meaning "words represent things because they produce in human organisms some replica of the actual behaviour towards these things as a mediational process".¹

The aim was to "account for these internal meanings as mediating r-s links, which have developed according to the strict laws of classic conditioning" (Greene, J. 1975 : 87). This approach to the study

of meaning relied on overt responses as constituting meaning.

The most radical behaviourist position was that of B.F. Skinner. According to Skinner, any segment of speech is under the control of some stimulus. Any state of linguistic behavior that is not directly observable was totally rejected by Skinner. The factor which led to the rejection of Skinner's views by a number of psychologists and linguists, was that Skinner based his account of "verbal behavior" on the results of experiments carried out on rats and pigeons. Linguistic behavior is explained by Skinner by concepts based solely on response, stimulus and reinforcement. As expressed by Greene, Skinner's approach to the study of linguistic behaviour is "a virtuoso attempt to explain language without taking into account any 'mentalist' events such as ideas, meanings, grammatical rules or even anything corresponding to the statement that someone can speak English" (Greene, J. 1975: 85). There is a view that it was Chomsky's vitriolic review of Skinner's "Verbal Behavior", that was responsible for Chomsky's entry into Psycholinguistics.

Psycholinguists like George Miller were disillusioned about the results obtained by behavioral
studies as they did not take into account the internal organization of language. ...nologists who were interested in acquisition, also found the generalisation made by Skinner across species, and from nonverbal behavior to verbal behaviour unsatisfactory and far-fetched.

But these factors alone do not account for the influence Chomsky has had on Psycholinguistics.

What attracted the interest of Psycholinguists was the underlying assumption of the Transformational Generative Model, that a grammar is a set of finite rules which can generate an infinite set of sentences. These innumerable sentences could be comprehended by a hearer, regardless of whether he had heard them before. Earlier psychological models had not been able to reflect this ability of human beings. "Chomsky's theory of Generative Transformational Grammar was the first to force psychologists to reconsider their whole approach to the study of language behaviour, and so heralded the psycholinguistic revolution". (Greene, J. 1972 : 15).

The idea that a speaker's linguistic competence can be revealed by uncovering the rules governing
linguistic behaviour provided a new challenge to psycholinguists.

If the study of performance could lead to a knowledge of competence, psycholinguists were in a position to contribute empirical data elicited by tests. This data, it was hoped, would lead to an understanding of linguistic competence. Psycholinguists had been carrying out experiments within the older theories of language in psychology. Due to Chomsky's new claims on language there was a spate of experimental work carried out by psycholinguists based on the Transformational Generative model and on psycholinguistic work that was developed within this framework.

Tests on grammaticality were first conducted by psycholinguists as a means of arriving at the speakers' linguistic competence. This was done through eliciting the speakers' judgement. Though several psycholinguists, at a later stage, did get involved with grammaticality and acceptability, the initial concern was with competence.

It is significant that the results of psycholinguistic testing did not have a direct impact on linguistic theory of the time. This could be partly
due to the fact that psycholinguists were concerned with language as human behavior, and not with linguistic analysis. Disputes which arose between linguists and psychologists as a result of tests on competence, are based on problems which also hold true for grammaticality. Generative grammarians were responsible for creating an impression that operations carried out in Transformational Grammar are directly correspondent to operations carried out in the mind of the speaker. It was thus expected that psycholinguistic tests could be carried out directly on linguistic hypotheses, and the results would correspond with linguistic analysis.

Psychologists have also accused linguists of not accepting experimental data as valid, while making claims about psychological aspects of language. Chomsky states that experimental data can only be meaningful in performance studies. There is thus a demarcation made by linguists, principally Chomsky, that psycholinguists need concern themselves only with performance.

In this context, Chomsky makes the distinction between grammaticality and acceptability by stating that only acceptability can be tested. Chomsky's refusal to
accept psycholinguistic evidence as valid and incorporate the findings in the theory, has caused a number of psycholinguists to move away from research based closely on linguistic models.

This view of psycholinguists is reflected in Greene's statement that "Chomsky's solution is to rely on native speakers' intuitive knowledge of what constitutes a possible sentence in their own language. But when it comes to investigating these intuitions, Chomsky argues against the efficacy of experimental procedures. For one thing, he points out that any such experimental techniques would have to be validated by their success in matching speakers' intuitions in the first place, this leaving the basic problem untouched". (Greene, J. 1972 : 100-101).

At the same time, the stronger the claims made by linguists about psychological processes, the more they are thrown open to experimental validation.

However, linguists do seem partly justified in not altering their theoretical position on the basis of psycholinguistic evidence, as experimental procedures have not proved effective in being able to reveal
linguistic abilities comprising competence. As Greene concedes "the main problem in trying to devise experimental procedures to get at these intuitions is to make sure that subjects are making responses on the basis of considerations relevant to linguistic competence". (Greene, J. 1972 : 101).

It is thus necessary to examine the extent to which psycholinguistic experiments have contributed to our understanding of grammaticality and whether it is possible for it to do so.

4.2 One of the earliest tests carried out with the specific purpose of examining Chomsky's claims on the nature of grammaticality was that of A.A. Hill. The purpose of this was not so much to conduct an operational test for investigating the nature of grammaticality, but to contest Chomsky's claims on the issue. Hill intends to refute Chomsky's statement in *Syntactic Structures* that speakers of a language can recognise

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1 It should be pointed out that Hill does not represent the psycholinguistic viewpoint. The tests conducted by Hill were limited in scope.
grammatical utterances, and agree on what they consider grammatical. Hill attacks Chomsky's definition of grammaticalness, involving native speakers' judgements.

Hill provides a list of ten semi-grammatical deviant sentences:

1. Colorless green ideas sleep furiously.
2. Furiously sleep ideas green colorless.
3. Have you a book on modern music?
4. The book seems interesting.
5. Read you a book on modern music?
6. The child seems sleeping.
7. I saw a fragile whale.
8. I saw a fragile of.
9. Those man left yesterday.
10. I never head a green horse smoke a dozen oranges.

Sentences 1 to 6 are from the set of sentences Chomsky gives in *Syntactic Structures* to discuss syntactic and semantic deviance. Sentences 7 and 8 are given by Chomsky to illustrate his argument that the grammaticality of a sentence does not depend on the likelihood of its occurrence. Sentences 9 and 10 are 'concocted' by Martin Joos, as reported by Hill.

These sentences were given to ten informants - three of whom were linguists.¹ The informants were

¹ This is justified by Hill as Chomsky refers to "any native speaker".
first asked to read the sentences aloud, and provide their own punctuation, if they felt inclined to do so. They were then asked to state which of the sentences they found acceptable. The results obtained by Hill were as follows:

<table>
<thead>
<tr>
<th>Sentence No.</th>
<th>Unacceptable to</th>
<th>Acceptable to</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>10 informants</td>
<td>0 informants</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>3</td>
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<td>5</td>
<td>4</td>
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<td>6</td>
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<td>6</td>
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<td>10</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

Some subjects changed their rating when rejected sentences were read out to them with changed intonation.

Hill found that the rating of sentences depended greatly on punctuation and intonation. The results show that there is no agreement among speakers about the grammaticalness of sentences. Thus a scale of grammaticalness cannot be built on the acceptance of sentences by speakers.

Hill suggests a different framework which deals with sentences to which a transform may apply. If sentences suspected of being ungrammatical were put in
a transformational framework, their suitability to these frames could be tested.

Twelve sets of sentences were constructed by Hill, using sentences used by Chomsky:

1. The plate is hot.
   The plate seems hot.
   The plate seems very hot.

2. The child is sleeping.
   The child seems sleeping.
   The child seems very sleeping.

3. The book is interesting.
   The book seems interesting.
   The book seems very interesting.

4. The hat is old.
   The hat seems old.
   The hat seems very old.

5. The wine was drunk by the guests.
   The guests drank the wine.

6. Golf is played by John.
   John plays golf.

7. The pie was eaten by John.
   John ate the pie.

8. John was drunk by midnight.
   Midnight drank John.

9. John is a man.
   Is John a man?

10. You have a book on modern music?.
    Have you a book on modern music?.
   Read you a book on modern music.

12. John can.
    Can John?

The informants were told that the eleven sets of sentences formed three groups such that the grammatical relations in all the sets of sentences in a particular group were the same. (The groups were so designed that in each group one set of sentences was deviant). The informants had to identify (for themselves) the three groups and to locate the deviant sets of sentences. The informants unanimously rejected the deviant sets.

According to Hill acceptability cannot be considered as a basis for grammaticality because speakers reject sentences on "nonlinguistic and idiosyncratic grounds". He feels that Chomsky finds many sentences unacceptable because he considers them in isolation. Hill finds this is ironic as transformationalists are primarily interested in processes.

Chomsky has refuted Hill's criticism\(^1\) by first

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\(^1\) Chomsky, N. 1963: \textit{Some Methodological Remarks About Generative Grammar}. 
stating that the sentences used by Hill from *Syntactic Structures* were not given as a basis for a behavioral test. The 'negative' results only show that a more "subtle approach" is needed. Chomsky also accuses Hill of confusing the meaning of transformations as meaning any statable relations and that the framework suggested by him can be effective only insofar as it is part of a large battery of tests.

Hill's first test is unsatisfactory because the ten sentences which contain different kinds of deviance seem too small in number to yield any definite result. The number of informants is too small to even reveal a trend. While giving instructions, Hill uses the term "grammatical" to the informants without defining or qualifying it further. This is likely to result in the term being interpreted differently by each informant. It should be kept in mind that Chomsky introduces these sentences to show that "grammatical" cannot be associated with 'meaningful' or 'significant' in any way. It seems likely that clearer results might have been obtained if these parameters were also introduced, as the rationale of this test was to refute Chomsky's claims. The debate was continued by R.I. Scott (1969) who conducted a test to disprove
Hill's claim that a scale of grammaticalness built on a speaker's acceptance cannot work.

According to Scott, degrees of grammaticality can be understood as stages in the disruption of a single standard kernel of English. The "standard" English kernel given by Scott is Subject-Verb-Object-Qualifier.

The four components of this kernel can be combined to produce twenty-four combinations. They will obviously be of varying degrees of grammaticality, and the degrees will be marked from 0 to 100.

Scott conducted his test with forty native speakers of English - all unacquainted with linguistics. The standard kernel used was

Subject Verb Object Qualifier
John gives roses to Sue.

Twenty-four permutations of this were given to the informants.

According to Scott's results, speakers recognise several intermediate degrees of grammaticality and completely reject others. He thus feels that speakers recognise word order. They reject or are confused by sequences that "split" or "scramble" the Unit SVOQ.
Disruptions in the order SVOQ are termed "moves" by Scott, whereas "splits" are those which disrupt SVO.

The maximum disruption possible, according to Scott is $3 \text{ moves} + 2 \text{ splits} = 5$ which is the index of disruption. Thus, there are 6 degrees of grammaticality - the indices of disruption being $0, 1, 2, 3, 4, 5$. A grammatical sentence would not have more than 2 or 3 disruption.

Scott then concludes that in English grammaticality seems to be the function of the SVOQ kernel.

One of the major concepts put forth by linguists which attracted the attention of Psycholinguists was that of linguistic competence. What was especially challenging was the idea that linguistic competence could be represented through a system of rules which had to account for the speakers' intuition. In constructing operational tests, judgements on deviant utterances were sought as a means of arriving at some measure of the speakers' intuition. Only as a proof (or disproof) of the existence of implicit grammatical and semantic rules was interest originally taken in deviant sentences. The experiments generated interest
in deviant sentences in their own right". (Chapman, R.S. 1974 : 12)

Though there were differences in interest, and interpretation of theory, there are certain fundamental abilities of a native speaker that are of interest to the psycholinguist as well as to the linguist. The study of deviant sentences is important for understanding the intuitive knowledge a speaker possesses in recognising and comprehending utterances of his language. If competence is regarded as consisting of abilities which constitute linguistic behaviour, it is not only the production and comprehension of sentences that interest the linguist and the psycholinguist. It is necessary to take into account what has been called "recognition competence" which enables a speaker to recognise sentences which are grammatical and those which are not. This is reflected by the degree of acceptability a speaker attributes to a particular utterance, and in the manner in which he comprehends sentences which are not totally grammatical. By doing this, the speaker displays different levels of tolerance. This intuitive knowledge of a speaker, manifests itself in the "use of" and "attitude" towards
deviant sentences. It is important to bear in mind however, that the study of deviant sentences cannot be divided into "use" and "attitude" as their boundaries overlap at many points, as shall be seen later.

Though most of the experimental work done was with a view to validating claims on the nature of grammaticality, it is the abilities, that have been referred to that are investigated. As shall be discussed below in greater detail, the methods used to elicit data on grammaticality draws on these abilities, to varying degrees.

One of the earliest pre-Chomskyan attempts to quantify deviance, was that of Miller and Selfridge (1950) - *Verbal context and the recall of meaningful material*. A set of sentences was prepared containing seven different degrees of approximation to English - from nonsense strings to completely grammatical sentences. Subjects were given the sentences and asked to recall them immediately. It was found that closer the approximation to English, the greater the accuracy of recall. "Miller and Selfridge made an important contribution in that they attempted to quantify meaning, to define operationally quantitative differences
between meaning and nonsense". (Frankart, J. D. 1964: 9-10).

A further refinement was carried out by Miller and Isard (1963) to test "the more specific function of speech perception as measured by the S's ability to repeat and ... whether violation of certain linguistic rules makes this task more difficult". (Miller, G. and S. Isard 1963: 218). However, it should be pointed out that by this stage, Miller and Isard used Chomsky's 1957 model as a theoretical base.

Three groups of sentences were constructed - normal, anomalous, and ungrammatical-anomalous. There were 150 sentences, all of them were 6-word sentences. The anomalous sentences were created by using the process of diagonalization, (by which one word is taken from each sentence of a set to create an anomalous string) across a set of grammatical sentences, so that while the syntactic structure was maintained, the semantic rules were violated. This resulted in sentences like "Gadgets kill passengers with the eyes".

1 Miller, Heiste and Lichten (1950) carried out a test, the results of which showed that 'content' words are more intelligible in the context of a grammatical sentence.

2 S = Subject. This is a standard convention in psychology
"Accidents carry honey between the house", etc. The ungrammatical-anomalous sentences were created by scrambling the set of grammatical sentences. For example,

"Around accidents country honey the shoot",

"On trains hive elephants the simplify".

The sentences were masked by noise while being presented to the subjects. Subjects were then asked to immediately repeat each sentence, which was recorded. The results showed that the ungrammatical-anomalous sentences presented the greatest difficulty as they isolated both syntactic and semantic rules. It is important to note here that in this test, and further tests based on this one, syntactic and semantic violation are created by scrambling and diagonalization and not by a conscious violation of certain syntactic or semantic rules.

A sequel to this test (Marks and Miller 1964) was run by adding a further set of ungrammatical-meaningful sentences. The "intent was to separate the semantic and syntactic components of an utterance and to show that verbal strings which follow the rules are easily recalled". The method used was free learning. The test proved that the anomalous-ungrammatical sentences were reported as the most difficult
to learn.

This experiment was repeated by McNeill (1972) to test the semantic development of children the age of 5 years to 8 years. The objective was to test whether, and to what extent, children are able to take advantage of semantic consistency to comprehend a sentence. It was found that the younger the children, the less they are able to take advantage of semantic consistency. Syntactic markers seem to be acquired before semantic markers. The relevance of this test here is that deviance is used as a variable to demonstrate the extent of acquisition.

Another test is that of Maclay and Sleator (1960) which attempted to test whether subjects differentiate between grammaticalness, meaningfulness and ordinariness as independent variables which do not overlap. For this test, Maclay and Sleator created six types of strings - three grammatical and three ungrammatical strings, combined with other types which are described below. Some of the grammatical strings were meaningless. For example -

"Appointments can winters geneously".
some traditionally incorrect like 

"Send one to Harry and I".

and others were correct. The ungrammatical strings were either semi-random word strings like

"A keeps changed very when",

or what the authors considered "bilingual-like" constructions eg.

"Yesterday I the child a dog gave".

The other ungrammatical strings were constructed as if they were typical responses to questions that had been asked previously - eg.

"Sometime early in the morning".

The set of sentences was ordered randomly, and given to three groups of subjects. Group I was administered tests for grammaticalness. Group II for meaningfulness and Group III for the variable of ordinariness. The subjects had to give only a Yes/No response. From the results, Maclay and Sleator concluded that judgements of grammaticalness are relatively independent of meaningfulness and ordinariness. The variable 'ordinariness' tests whether the subjects ratings are affected by his finding the stimulus sentences bizarre or unusual.
This test is important because of the variables introduced along with grammaticalness, which in turn have been used by later experimenters. However, it has been noted that a direct Yes-No response is not a suitable way to test for grammatical and a more accurate picture could have emerged if more indirect means had been employed. This method has the disadvantage of making the subject aware of the variable being tested, and thus makes him conscious. Also there is no way of determining the extent of deviance perceived by the subject. Also the classes of deviant sentences like "bilingual like constructs" and "traditionally incorrect" are not sufficiently defined and might have prevented a clearer picture from emerging. However, Maclay and Sleator's experiment does show that speakers are capable of recognizing deviant sentences.

Maclay and Sleator's test is not directly dependent on Chomsky's formulation of grammaticality. However, as has been mentioned earlier operational tests were devised to validate claims made on the nature of grammaticality based on the Transformational Generative Model. Coleman (1965) devised a test using the Miller-Chomsky analysis of hierarchy of categories. For the
test material, Coleman constructed ten series of four sentences. Each of these series of sentences included four "levels" of grammaticalness. These were obtained by cutting phrase structure trees at four different levels. At the lowest level were strings of random words, for example:

- 'the marching a on and its' (level 1)
- 'nickels a can are come the' (level 2)
- 'the door should be climb Bozo' (level 3)
- 'the girl should be Allen' (level 4)

As can be seen, level 4 is the most nearly grammatical. The tasks used in this test were ranking, learning, and recall. The tasks were used in the following way - Subjects were asked to rank the sentences within each series in order of grammaticalness. For the learning task, subjects were given a one-second exposure per sentence, and asked to reproduce the stimulus sentence. Scoring was done by counting the number of one-second exposures needed by a subject to reach one perfect repetition of the stimulus sentence. To test recall, five tests were prepared at each level of grammaticality. Each word was deleted once, and there was only one deletion per sentence.
The subjects first guessed the missing word, then read the completed set, and were asked to then recall and fill the blanks.

It should be noted here that in the test using recall, certain other variables also enter the results. In guessing the missing word, subjects are making use of predictability. A certain amount of effect is also caused by the variable of familiarity. Through repeated exposures, the stimulus sentence can gradually cease to be unfamiliar. However, as the time of exposures is very short, this would not be a major influence. It can be suggested that the variable of familiarity might lower the deviancy ratings to some extent, however small.

The results showed that ranking was done in the predicted order. Learning was more difficult on the lower levels of grammaticality. Correct insertions in the recall test increased as a function of level of grammaticality and prior exposure.

More basic work on the nature of grammaticalness was carried out by Danks and Glucksberg in a series of experiments. Experiment-I was was carried out to
test if subjects ratings vary as a function of formal levels of grammaticalness. Further, this experiment intended to examine if the ratings could be described in terms of the single dimension of grammaticalness. The material used was based on the sets constructed by Coleman on the basis of the Chomsky-Miller conception of word-class hierarchy (as has been described on p.102).

The sentences were grouped into 4 series with four levels of grammaticality as in Coleman. The sentence length of each of the series was fixed. The subjects were first asked to rank the sentences, which were mixed in a random order. The second part of the test consisted in marking the same sentences as "grammatical" or "ungrammatical". These terms were not defined in any way for the benefit of the subjects. Subjects were left to interpret them on their own. However, only if a subject asked whether "grammatical" meant independent of meaning, the answer was 'Yes'. The sentences used were

<table>
<thead>
<tr>
<th>Level I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series A</td>
</tr>
<tr>
<td>Series B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
</tbody>
</table>
Sentences used in Experiment I (from Coleman, 1965).

Level II

Series II
A  It will danced.
B  One the could do a her.
C  A a to the can on knew William so.
D  Her the son tugged couldn't kitten about the little.

Level III

Series III
A  It said Johnny.
B  The grass seldom were stuck Lindy.
C  He took of the books the shape suddenly sweetly.
D  The noise won't take for the maids at the machinery.

Level IV

Series IV
A  She has Africa.
B  The dust could always be Disneyland.
C  Cindy so sadly threw some rain toward a flower.
D  This glass must get it up on the straw.

The results showed that the ranking was in the predicted order, as in Coleman. But the scores in Danks and Glucksberg were also processed for consistency, and were found as having high within subject and between subject consistency. There was "strong evidence for adults having stable and essentially similar internalised
criteria for judging grammaticalness .... (and) .... that grammaticalness was scaled as a linear function that was common between subjects (Danks, J. and S. Glucksberg 1967).

A large number of subjects were used for the test and the scoring was statistically worked out. Referring back to Hill's experiment we find that these results contradict Hill's contention that speakers have no unified concept of grammaticalness and are not capable of recognising degrees of deviance.

It should be noted however, that the Chomsky-Miller hierarchy of word classes was not designed for operational tests, but as a device for accounting for degrees of grammaticality. Though it can be argued that it is through the speaker's performance that one can arrive at his competence. As far as psycholinguistic tests are concerned, it should be borne in mind that linguistic competence may not be the same as psychological competence, and it might be useful to distinguish the two. (Chapman, R.S. and R.E. Davidson).

In this light, it is interesting to look at J.D. Frankart's (1964) experiments which aim to show
whether grammaticalness is a meaningful psychological dimension. This would be the case, according to Frankart, if -

1. Degree of grammaticality and ease of learning are positively correlated.

2. As structure increases, dependence on word to word association decreases.

3. Errors occur in more random distribution in ungrammatical sequences, than in grammatical utterances. This is because in grammatical utterances the pattern of errors is strongly influenced by the grammatical structure.

To test these hypotheses, four sets of word sequences were constructed. There were 150 sentences in all. Two sets were at the extremes of grammaticalness (that is, one totally grammatical, and one totally ungrammatical set) and two sets were at intermediate levels. The range of deviant utterances were from "anomalous sentences, scrambled sentences, bilingual constructions, incomplete sentences and incorrect usage". (Frankart, J.D. 1964 : 24). Subjects were asked to rate these sequences on a scale of grammaticalness, independent of meaning. On the
basis of the ratings four lists were prepared - the sentences with the lowest ratings formed List I and those with the highest ratings were in List IV. The sequences were then divided into two major phrases and the words that bound the between-phrase transition were placed in a paired-associate test. Each list of sequences was complemented by a paired-associate list. The paired-associate list was used for "familiarizing" one group by making them learn the paired-associate list before being exposed to the sequences.

The results showed that the speed of learning increased corresponding to the increase in grammaticality. Frankart also found that association assists learning, but the more grammatical an utterance is, the lesser dependence there is on association. This would mean that grammaticalness is a more crucial variable than association, in the task of learning. Frankart thus concluded that grammaticalness is a meaningful psychological dimension.
4.3 On the basis of the tests discussed, we can see that psycholinguistic research was not concerned with grammaticalness only as means of arriving at certain conclusions about linguistic competence, but as a meaningful dimension in its own right. As has been said before, much of the experimental work has been done with a view to validating Chomsky's theories, and trying to find whether concepts described by him have psychological reality. In trying to describe grammaticality in these terms, what is done, in effect, is investigating various abilities of native speakers. This, as will be seen, is done through responses of speakers to various kinds of deviant sentence, in an attempt to quantify deviance.

Deviations are classified into various categories on the basis of rules that they violate. Thus, one way of ascribing degrees of grammaticalness is to investigate the extent of deviation caused by the various types of rules. This would also, then, provide an insight into the psychological reality of the rules concerned.¹

¹"It is possible that the rules governing the relations between semi-sentences and fully grammatical sentences too have some psychological reality" (Marks, L.E. 1965 : 3)
The experiment carried out by Marks and Miller already described earlier attempted to "demonstrate that semantic and syntactic rules have a psychological reality, that they can be independently manipulated, and that the results of their manipulation are specific and have behavioral effects ... It is expected that violations of semantic rules will lead to one type error, violations of syntactic rules to others". (Marks, L.E. 1965 : 8).

It shall be seen that most of the experiments concentrates on either syntactic or semantic deviations, or at least base the material used on this distinction.

L.E. Marks (1965) carried out a number of experiments based mainly on the effects of certain types of syntactic deviance. One experiment\(^1\) was run with the hypotheses that "fluent native speakers can rank semi-sentences according to degrees of grammaticalness, and have a higher inter-subject agreement.\(^2\) It further aimed to show that when the order of proximal words in a sentence is reversed, breaks in major phrase

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2 This hypotheses was also successfully proved by Danks and Glucksberg as described earlier.
barriers have a more detrimental effect on grammaticality ratings than those which leave phrases intact. Also that the serial position of a violation determines the amount of ungrammaticality caused. As stimuli, Marks used four semi-sentences. These were constructed by reversing proximal words in a sentence. The sentence used was

The boy hit the ball.

The subjects were asked to rank the sentences from 1 to 5 in order of their grammaticalness. The results showed that native speakers are able to rank sentences in order of their degrees of grammaticalness, and also show a high inter-subject agreement. Disruption of phrase boundaries in the stimulus sentences resulted in lower grammaticality ratings, than those in which the phrase boundaries were left into it. Also it was observed that the earlier in serial order the disruption occurred, the greater the deviation as perceived by the subject.

To pursue this idea more intensively, in another part of the experiment, only those deviations were examined which "maintain the integrity of large phrases".
Eight variations each were created from two normal sentences. Four were created by inversions within phrases, and among phrases. The sentences from which these were created were:

1. The grey dog has buried the dirty bone in the moist earth.
2. The brown bear may steal the golden honey from the buzzing hive.

Three more semi-sentences were created by inverting the order of the entire phrases. Subjects were asked to rank the sentences in order of their grammaticality. As expected, sentences in which phrases were undistorted were considered the most grammatical. The earlier in the string the reversal occurred, the more ungrammatical a string was considered. The random arrangements of phrases in a sentence resulted in the lowest ranking.

The third part of the experiment was based on the hypothesis that if native speakers can judge semi-sentences in terms of their relative grammaticality, then they should be able to rank the various phrases in terms of their importance in undistorted sentences.
To test this, the same two sentences were used as in the previous part of the experiment, but the phrase boundaries were marked. It was found that there was a correspondence between judgements of grammaticalness and relative importance of a phrase as perceived by the subject. Distortion of a phrase which led to a string being ranked low on grammaticality, meant that the phrase was important. The Verb Phrase, for example was found to be the most important, whereas the Adverbial Phrase was considered the least important. It was also thus concluded that syntactic categories have psychological reality.

Marks also ran a test based on memorisation, by measuring the latency of responses. The more grammatical a semi-sentence was, the easier it was to memorize. The earlier the disruption occurred in the string, the greater the violation. This, according to Marks is a result of the fact that the earlier in the sentence a violation occurs, the more difficult it is to predict what the rest of the sentence is likely to be.

The importance of Mark's experiments is that one dimension of deviance - that is, the extent of
deviation caused by word order disruption has been exhaustively examined. One more significant factor about deviance revealed by these experiments is the effect of the serial position of the deviation. This, according to Marks is a psychological factor as the earlier the violation occurs in a string, the fewer the possibilities there are of being able to limit the words that may follow. This has also been taken as evidence of the fact that sentences are processed from left to right in effect, by serial order.

Mark's work on semi-grammaticalness is important as an attempt to study syntactic deviation without any recourse to meaning. This can be seen as a result of the then prevalent view that syntax and semantics could be studied separately without reference to each other.

After 1965, it becomes possible to trace the more direct influence of the Transformational Generative model on the experimental work done on grammaticality. This can be seen in terms of the kinds of violations tested. Downey and Hakes in *Some Psychological Effects of Violating Linguistic Rules* (1968)
investigated Chomsky's proposition that violations of a more general rule will cause greater deviation when violated, than a rule of lesser generality. To test this, violations of three kinds of rules were tested - Phrase Structure Rules, Strict Subcategorisation Rules and Selectional Restrictions.

Sixteen strings with the same structure were created. From each of these, three additional sentences were created each representing one kind of rule violation. For example: "The woman may endure grief"
Phrase Structure Violation - "The woman may petty grief"
Subcategorisation Violation - "The woman may arrive grief"
Selectional Restriction Violation - "The woman may grief"
Sixteen sentences with the same structure were also added as fillers.¹

Subjects were asked to perform three tasks in this test. Subjects were first asked for a rating on a four point scale. The scale was from 0 = completely acceptable, and 3 = completely unacceptable. The same subjects were then asked to paraphrase the sentences they had rated. This was done by asking them to rewrite

¹Fillers are strings which are added to testing material to distract the attention of the subject from the variable that is being tested.
the sentences according to what they thought the sentence meant. Finally, the subjects were given sets of ten sentences which contained two normal sentences, one of each type violation and fillers. These were presented to them in a learning task. Each set was presented in a four second exposure, and there was also a four second intersentence interval. The subjects were then asked to write as much they could remember of each sentence.

The results showed that the ratings were in the predicted order with violations of phrase structure rules resulting in the greatest deviation, and violations of selectional restrictions the lowest.

However, the results in the learning task were not as expected. The normal sentences were learned the fastest, the ones with the phrase structure violations took the longest time to learn. The sentences with the subcategorisation violations were learned faster than the ones with selectional restriction violations. This factor was not explainable. In the paraphrase task, the subjects found that the normal sentences were the easiest to paraphrase, but no dominant strategy emerged. This showed that the results of one task were not consistent with the others.
Stolz (1969) however refuted Downey and Hakes (1968) by his results. Stolz used eight kinds of sentences - true, false, contradictory, analytic, anagrams, violations of selectional restrictions and subcategorisation rules. The tasks used were rating, short-term memory task, and free-recall. All the tasks showed consistent results.

Most of the tests reviewed above involve tasks which are reliant to some extent, on the subjects ability to interpret the test sentences. The variable of interpretability was most directly tested by Danks and Glucksberg. Interpretability and the scale of grammaticalness (1970) investigated the ability of speakers to differentiate degrees of grammaticalness of sentences where the meaning was clear. The material used for this test consisted of four levels of sentence types. There were four sentences on each level.

Level I contained ungrammatical and uninterpretable sentences produced by diagonalization - eg.

The successful can to a voters.

1The use of the term 'Level' here differs from that as used in Coleman (p. 202) where level referred not only to the degrees of grammaticality, but levels on the phrase structure tree.
Level II was created by restrictions as verbs. eg.
IIa. The man sleeps the car dangerously was caused by the restriction of (+ ---NP), and
IIb. Had the additional restriction of [ [+ [+Abst]—
[+Anim]] resulting in sentences of the type.
"Vice detests the man to action".
Level III contained sentences which were interpretable but deviant. Sentences in Level IIIa ignored the feature [+ Mass] and IIIb [+ Human]. For example:
IIIa. A grass grew quickly with care.
IIIb. The professor muttered quietly to itself.

The method used for this test was ranking the sentences within each set from I to IV. Each set contained 4 sentences, one of each level. The ranking was done in the predicted order, and was consistent to all levels. It is interesting to note that the difference between IIa and IIb and IIIa and IIIb did not yield any difference in the ranking. However it is useful to note that the deviant sentences have not been made up arbitrarily, but with specified violations of a given selectional restriction or semantic feature.

It should be recalled here that the idea that
deviant sentences can be classified according to the rule they violate, suggested by Chomsky (1965).

Another important study on the psychological relevance of semi-grammaticalness is that of Davidson (1966). Davidson has clearly specified the type of deviance he intends to study: "... one sort of semi-grammaticalness can be defined as the breaking of selectional rules. Furthermore, semi-grammaticalness as defined can be further delimited to one kind of syntactic marker violation - i.e., human, abstract, concrete". (Davidson, R.E. 1966: 12). Davidson has also chosen the method of free-recall learning, as among other reasons, it would provide a basis for comparison with Marks and Miller (1964), and as Chomsky has hinted "might provide relevant data".

The strings used for this experiment were constructed out of a common pool of fortyfive words and concentrated according to the various experimental conditions.

The strings were organised into levels one level had no violations, level two had one violation and level three had three violations. For a control
condition there was one level which constituted "word-salads" - to provide the most deviant condition.

Davidson also has another hypothesis about free-recall based on the results of some tests which indicate that nonreversible strings are easier to recall than strings which are reversible. Thus for each level there is one list of reversible strings and one list of non-reversible strings. It should be kept in mind that the violations of selectional restrictions are of three specific markers - [human], [abstract] and [concrete].

Examples of the types of strings

<table>
<thead>
<tr>
<th>Normal Non Reversible</th>
<th>: Maximal Freedom terrifies giddy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Violation Non</td>
<td>: Astute Professors wrinkle</td>
</tr>
<tr>
<td>Reversible</td>
<td>abiding courage.</td>
</tr>
<tr>
<td>One Violation</td>
<td>: Black mud disconcerts</td>
</tr>
<tr>
<td>Reversible</td>
<td>shimmering snow.</td>
</tr>
<tr>
<td>Three Violation</td>
<td>: Giddy freedom engraves</td>
</tr>
<tr>
<td>Non Reversible</td>
<td>maximal spinsters.</td>
</tr>
</tbody>
</table>

---

1. Reversible strings - Strings where noun phrases which function as the subject or object of a sentence can be syntactically and semantically reversed.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Violations Reversible</td>
<td>Giddy freedom wrinkles</td>
</tr>
<tr>
<td></td>
<td>bashful courage.</td>
</tr>
<tr>
<td>Random Normal Non Reversible</td>
<td>Shimmering snow terrifies</td>
</tr>
<tr>
<td></td>
<td>astute infants.</td>
</tr>
<tr>
<td>Random Normal Reversible</td>
<td>Bashful Professors terrify</td>
</tr>
<tr>
<td></td>
<td>brawny generals.</td>
</tr>
<tr>
<td>Single Control (word salad)</td>
<td>Tools object flowered</td>
</tr>
<tr>
<td></td>
<td>general</td>
</tr>
</tbody>
</table>

Learning ability of the subjects was tested by written responses. Subjects were shown a set of strings and given three minutes to recall a set of nine strings.

The results showed that reversibility was not an effective variable in free learning. Nouns were recalled accurately more often than adjectives or verbs. This, according to Davidson, may find support for Chomsky's theory that it is the free choice of nouns which places constraints on the choice of verbs and adjectives. It was also found however that as the number of violations increased there was a corresponding amount of discipline effect on the recall of verbal strings. Davidson concludes that "semi grammaticality does have meaning in terms of human performance".
It is important to note however that Davidson's test only shows the effect of semi-grammaticalness on free learning, and thus does not draw on the speakers' ability to detect or qualify deviance in any way. In this respect, Chapman's (1973) is more successful, as it is a comprehensive study which attempts to answer these question. The material used, however is in many ways similar to that which is used by Davidson. Chapman clearly tested whether an increase in the number of violations in a sentence result in the higher rating of deviance. It is also tested whether this would lower the rating for ease of paraphrase. Chapman also investigated whether unmixed lists of SR\(^1\) violations are rated as less deviant and easier to paraphrase than unmixed lists of SSC\(^2\) sentences?

(Chapman, R.S. 1973 : 36-37).

Chapman also aimed to test if there was a correspondence between well-formed paraphrases and the number and kind of violations.

Sixteen normal sentences were constructed from which sentences containing one, two or three SR and SSC violations could be derived.

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\(^1\) SR - Selectional Restrictions.  
\(^2\) SSC - Strict Subcategorisation
The 16 normal sentences were of the types:


"The SR violations were introduced by substituting an appropriate to the following N in subject and object phrases (A-N(S) or A-N(O) violations) A third SR violation was met by introducing a Vt inappropriately restricted in subject (V(S)) or object (V(O)). 16 A-N(S), 16 A-N(O), 8 V(S) and 8 V(O) violations were chosen.

The semantic features violated along with the frequency of occurrence were as follows:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>[+ animate]</td>
<td>13</td>
</tr>
<tr>
<td>[- animate]</td>
<td>11</td>
</tr>
<tr>
<td>[+ human]</td>
<td>5</td>
</tr>
<tr>
<td>[- human]</td>
<td>2</td>
</tr>
<tr>
<td>[+ collective]</td>
<td>1</td>
</tr>
<tr>
<td>[- collective]</td>
<td>1</td>
</tr>
<tr>
<td>[+ abstract]</td>
<td>9</td>
</tr>
<tr>
<td>[- abstract]</td>
<td>7</td>
</tr>
<tr>
<td>[+ event]</td>
<td>2</td>
</tr>
<tr>
<td>[- event]</td>
<td>2</td>
</tr>
<tr>
<td>[- liquid]</td>
<td>1</td>
</tr>
</tbody>
</table>

The other "four violations were of the V(S) in which the verb was restricted to [+ human] and the noun subject was marked [- animate]." (Chapman, 1973: 38)

The "marker categories" were taken by Chapman from Weinreich, Chafe and Chomsky.

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2 Det = determiner; A = adjective; N = noun; Vt = transitive verb; PP = prepositional phrase of frequency, duration, direction, or place; of = linkage for surface form of noun complement (Chapman, R.S. 1973: 38).
Listed below are examples of the sentences used by Chapman:

**Selectional Restriction**

**One Violation** : "The copper scarcity of food drove the deer herd toward the valley".

**Two Violations** : "The copper scarcity of food lasted the deer herd three times".

**Three Violations** : "The impending winter of food lasted the deer herd three times".

Chapman used three tasks for this test. There were three lists of each of the type listed about 80 that every kind of deviation could appear once and there would be no repetition.

Subjects were first asked to rate the sentences on a 7 point scale. 0 = Normal, to 6 = extremely deviant.

The second was a paraphrase task. After rating a sentence, subjects were asked to paraphrase it. After paraphrasing the sentence the subjects were asked to rate the ease of paraphrase from -3 very hard to +3 very easy.

For the paraphrase task, subjects were divided into two groups. One group was asked to produce a
paraphrase of the given deviant sentence. This was to be
done by making the smallest possible change needed to
turn it into a sentence that would be considered by
others. The second group was called the interpretation
group. Subjects of this group were asked to interpret
the deviant sentence in terms of what they thought the
speaker of the deviant sentence had in mind. The sent-
ence produced on this basis was to be one that could be
easily understood by others.

It was found by Chapman that deviance ratings are
strongly affected by the number of violations. More
violations also result in the subjects finding deviant
string more difficult to interpret and correct. Con-
sequently, there are fewer normal paraphrases of such
sentences.

As can be expected, violation of more general
semantic category like [animate] result in greater
deviance than violations of categories like [human]
and [abstract]. "The violation of the grammatical
restrictions (strict subcategorisation features) carried
by nouns or by verbs upon nouns is more deviant than
the violation of the restrictions carried by verbs upon
prepositional phrases". (Chapman, R.S. 1973 : 65)
The results showed that correction of deviant sentences was rated easier than interpreting them. Nouns were retained in a paraphrase more than verbs and adjectives. When there was a violation of a contextual restrictions it was found that subjects tended to substitute the elements, rather than change the deviant context.

Chapman found that there was no significant observable difference between SR violations and SSC violations as far as deviancy ratings are concerned. Ratings of violation of semantic features show that violation \([\mathbf{+} \text{abstract}]\) produces lesser deviance than \([\mathbf{+} \text{human}]\) which is lesser than \([\mathbf{+} \text{animate}]\). This then provides justification for the concept of feature hierarchy.

The interpretation group which was asked to produce nondeviant sentences on the basis of provided deviant sentences produced a great number of normal paraphrases. This might mean that speakers find it easier to correct than to interpret and thus the easiest correction would contain lesser deviant elements. "The results give support to the notion that paraphrases are derived from deviant sentences in a rule-governed manner". Evidence from SR paraphrases show that information from semantically deviant as well as well-formed portions of the
sentence is used to construct an interpretation, when that interpretation can be cast in the form of a normal sentence (Chapman, R.S. 1973: 62-63).

Thus, the Chapman experiment shows conclusively that speakers do recognise deviance and are able to rate them for deviance, they are also able to interpret and correct a large number of deviant sentences inspite of syntactic and semantic violations. According to Chapman, speakers have much greater capacity of interpreting deviant sentences than is attributed to them by most models.

The tests described so far have shown that a combination of factors are responsible for the extent of grammaticalness as perceived by speakers. Though the stress has been on syntactic organisation and semantic consistency of sentences, other variables have been tested as well (by Maclay and Sleator, Danks and Glucksberg in tests already discussed). In this context, it would be useful to review some tests which were carried out with the idea of comparing the effects of a number of variables. Danks and Glucksberg's _Scaling of Syntactic and Semantic Deviance_ (1968) was aimed at
assessing the relationship between grammaticalness, meaningfulness and familiarity, as revealed in sentence rating. Syntactic and semantic deviance in sentences were used to test whether "grammar and meaning could be judged independently, and if each is a unitary dimension in terms of psychological scaling". (Danks and Glucksberg 1968: 128). The four classes of sentences used by Marks and Miller (normal, anagram, anomolous, anomolous-anagram), were used by Danks and Glucksberg, along with the variable of familiarity used by Maclay and Sleator. Thus eight groups of sentences were formed, having all possible combinations of grammaticalness, meaningfulness and familiarity. There were 100 sentences in all. Some of these were from existing tests and the other constructed specifically for the purpose of the test being described. Groups gmf, gmf, gmf, gmf were taken from Maclay and Sleator. Distorted sentences from Marks and Miller were taken for f. Some of the sentences from group gmf were taken from children's recorded speech. This was done to provide some effect of naturally occurring deviance which can be encountered in natural circumstances. Another set of sentences (some in gmf, gmf, and some in

The classes of sentences were coded as: Syntactically correct and deviant g and g̅; semantically correct and deviant m and m̅; familiar and unfamiliar f and f̅.
are interesting in a similar respect as they consist of sentences which a subject finds possible and is likely to encounter, but would find them deviant out of their context. Some of the gmf, and gm were taken from Shakespeare, Dickens, McLuhan, Tolkien, the Beatles, Lewis Carroll, Allen Ginsberg, and expressions of slang. The set of gm were taken from Kant, Husserl, Merleau-Ponty, and from scientific literature. It was presumed that these would be unfamiliar to the subjects who were rating them. Examples of sentences used in the Experiment Scaling of Syntactic and Semantic Deviance.

gmf Pink bouquets emit fragrant odours.

gmf He growed up fast.

gmf T'was brillig and the slithy toves did gyre and gimble.

gmf Vernier acuities are inseperable for test targets.

gmf Lucy in the sky with diamonds.

gmf Get me from the kitchen a big spoon.

gmf Pink accidents cause sleeping storms.

gmf Tables down cod ashes rock under off two syrup.

The sentences were randomly ordered and presented to four groups of subjects. Each group rated the sentences on a scale of 0 - 10 for only one of the variables - Grammaticalness, Meaningfulness, Familiarity and Ordinari-ness. No information regarding meaning of terms and used
provided. The results showed that subjects treated familiarity and ordinariness as equivalent concepts. gmf were rated highest and gmf lowest as expected, with a high degree of consistency. But it was found that the ratings for gmf were higher for grammaticality, than expected, as the m and f variables seemed to increase the g factor. Correspondingly, m and f variables were also rated higher with g. Subjects do seem able to make fine distinctions between levels of grammaticality and meaningfulness.

A direct study on how these factors affect comprehension was conducted by Danks (1969). Downey and Hakes, as well as Chapman, have through experiments on the paraphrase task been able to throw some light on how different dimension of deviance affect comprehension. Danks (1969) attempts "a) to assess the validity of the operations devised to produce the different kinds of deviant sentences; b) to determine what variables were the most important in S's judgements of comprehensibility; c) to assess S's ability to make consistent responses to these sentences". (Danks, J. 1969 : 688).

The variables used in this test were grammaticality, meaningfulness, word frequency, interword association and sentence frames.
120 basic sentences were divided into two sets. Sentences in Set I were all of the form \( Adj_1 + N_1 + V_t + Adj_2 + N_2 \) and were further divided into two subsets of high and low frequency. For example (high frequency) - "colored pictures please sick children." (low frequency) - "Frenzied rhymes arouse intense emotion." Set II sentences were divided into four subsets on the basis of interword associations and sentence frames.\(^1\) Further subsets were created on the basis of high and low association. One group from each subset was selected arbitrarily for anagrammatization, \( \overline{gm} \), diagonalisation \( \overline{gm} \), \( gm \) (both operations) and \( gm \).

Each set presented to the subjects was randomly ordered. Subjects were asked to rate the sentences according to how comprehensible they were in terms of what the speaker was trying to communicate. The rating was from a scale of 0 to 10. It was suggested that "comprehensibility might involve concepts like grammaticality, meaningfulness and familiarity", among others.

The results of this test showed that three factors

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\(^1\) Danks, J.H.: "Grammaticalness and Meaningfulness in the comprehension of sentences 1969. Journal of Verbal Learning and Verbal Behavior 8: 688 for details of teste construction. Construction of materials is not being discussed in detail here as it is lengthy and complex
could be identified as having a bearing on comprehension-ungrammaticalness, non-meaningfulness and comprehensibility. gan sentences were rated highest and gm lowest as predicted. The comprehensibility factor seemed to be a joint function of G and M. Diagonalization and anagrammatization did produce interpretable sentences.

In another part of the test which functioned as a pilot study, sentences from only Set I with the high association words were used. Comprehension was tested directly through latency. Subjects were asked to press a key when they understood a stimulus sentence. Another group was asked to "correct the grammar" while yet another group was asked to correct the meanings.

Judging from the results of both parts of the test, Danks concluded that the major variables affecting comprehension were meaningfulness and grammaticality as defined by the procedures of diagonalization and anagrammatization. "The larger effect of M relative to effect of G was expected, since failure to provide an acceptable semantic description may require supplementary syntactic reprocessing before an acceptable semantic description is discovered". (Danks, J. 1969: 695).

1 The term latency is used to refer to the amount of time taken by a subject for performing a task.
Danks finds evidence from the behavior of his subjects that the same kinds of rules cannot operate for syntax and semantics.

Fillenbaum (1970) conducted an experiment to test speakers' ability to "impose sense" on deviant sentences as revealed by paraphrases and "objectify" impressions on the paraphrases by testing how sensible these were found by other speakers. For conducting the test, Fillenbaum constructed a set of 48 sentences some of which were semantically anomalous, ungrammatical, consisting of reversals in word order, and word salads. These were put in random order. 40 subjects were asked to paraphrase or rephrase these sentences, keeping the meaning that the speaker of the sentence might have wanted to convey. From the paraphrases thus produced, sets of 10 sentences were constructed with one source sentence and nine paraphrases. A fresh group of subjects was asked to pick three sentences each from the given sets as the most acceptable and three sentences which were the strongest or least acceptable.

The results showed that on the whole, well-formed source sentences produced paraphrases that were more
acceptable. There is also not much difference in the rating of the source sentence and the paraphrases. However, the interesting finding is that "malformed" sentences tend to get replaced by more sensible and acceptable paraphrases, while simple well-formed sentences tend to get more complex and elaborate as that remains the only way in which they can be altered.

As can be seen from the experiments described in the earlier section, there is a set of conclusions that can be arrived at, without much controversy.

It is clear, as has been stated earlier, that speakers of a language do have the capacity to detect deviance and recognise degrees of deviance. This has been shown by many successful tests using ranking and rating tasks on deviant stimulus sentences. It is also clear that deviance in many forms affects comprehension, but subjects are able to impose an interpretation on them, inspite of that. It has also been seen that not only syntactic and semantic violations are responsible for deviance, but factors like familiarity and association contribute to what a speaker may perceive to be
deviant. From the psychological angle, we also know that deviance effects learning and recall.

Though, as has been said earlier, all the tests have been directly or indirectly a result of attempts to validate Chomsky's statements on grammaticality, some of the conclusions that have been arrived at, present contrary evidence. It is important to bear in mind that Chomsky's model is a linguistic model, and not a behavioral one. Thus, findings of the type that speakers do not make a distinction between violation of Selectional Restrictions and Strict Subcategorisation Rules cannot be considered as evidence contrary to the distinction made by Chomsky.

In this context, what is important is the evidence provided by Downey and Hakes and Danks and Glucksberg that familiarity is an important parameter for a speaker who is being asked to rate a deviant utterance. Familiarity can obviously be linked to frequency of occurrence. This is contrary to Chomsky's statement that frequency of occurrence has nothing to do with grammaticality. Chomsky's contention is that a deviant utterance cannot be considered less deviant on account of its likelihood of occurrence. However, tests described earlier, do
show that exposure to a deviant form seems to lower the deviancy rating of a given deviant utterance. Speakers of a language do seem to take into account the likelihood of a given sentence occurring. Familiarity does not appear to be considered on par with syntactic or semantic "correctness", but does affect the deviancy rating to an appreciable extent.

As has been stated earlier, and demonstrated through the description of experiments, grammaticality is a concept that refers to a set of abilities controlled by the native speakers. As we have seen, what the experiments have been doing, in effect, is testing these various abilities, albeit indirectly in most cases. At this point it is significant to point out that when subjects have been asked to rate a given set of sentences for grammaticalness, it has been either not defined in any specific terms for the benefit of the subject, or has tacitly been equated with syntactic ordering, by being placed in opposition to meaningfulness. Thus one cannot be sure of what parameters are being put into use by the subject when he directly rates or ranks a sentence for grammaticalness.

It can be seen that the various tests of grammaticality tests the use of deviance, or the attitude towards
it. This is because recognition of grammaticality is closely bound to recognition of deviance. As is evident, the use of, and attitude towards deviance is not a sharp and watertight division, but one which overlaps at many points. Since the terms grammaticality and acceptability have been used in conjunction it might be useful to make the distinction (which will be dealt with in greater detail at a later stage) that acceptability is more directly concerned with attitude.

Investigation of the use of deviance would be possible through either observation or through testing. Observation would be then restricted to production of deviant utterances in natural contexts. This would perforce be rather limited, though undoubtedly valid. Apart from stray instances of deviance due to a variety of reasons, consistent cases of deviance would be restricted to children's speech or that of foreigners or learners of a second language. In effect, this would consist of adult or child learners. Comprehension of deviant utterances though constituting a part of 'use' is not strictly observable.

1 For this division as well as some other concepts in the following discussion I am indebted to Quirk and Svartvik (1966) and Greenbaum and Quirk (1960).
Testing makes it possible to investigate a wide set of variables, but since this would involve an artificial controlled situation, there would be limitations as the validity of the findings would then depend on all the factors used for construction of the tests.

Testing methods that would reflect use most directly are "Performance Tests" (vis-a-vis Judgement Tests) which involve correction and paraphrase of deviant sentences as this would reflect the subjects competence. However, to repeat, subjects when carrying out such tasks are likely to be more conscious, and some confusion may arise from the deviant stimuli sentences presented to the subject. Paraphrase and correction tasks will more clearly reflect the comprehension of deviant utterances.

Learning tasks which involve recall and memorization would indirectly reflect the subjects use and comprehension of deviant utterances as it has been observed that deviance causes disruption in learning and recall. This would also be open to some dangers inherent in a test situation as recall and memory of subjects may vary with individual abilities and associations of which the experimenter might be ignorant.
If one uses the Greenbaum and Svartvik distinction between potential and habitual use, then it is evident that testing situations allow one to investigate only potential use of deviance.

Investigations on 'attitude' as compared to 'use' can be more thoroughly tested through experiments. The so-called judgement tasks involving ranking, rating and correction, display the subject's attitude most directly. However, since these tasks are dependent on the method of test construction and the type of instructions given, it might not always be evident to the experimenter, what variables a subject is using in his ranking and rating. Since scalar values used by experimenters vary from 2 to 10, these responses might not be always reliable. Correction of deviant sentences is more likely to recall the subjects recognition of deviance as well as his attitudes. Attitude towards habitual deviance is not easy to observe or quantify in any way.

Indirectly, attitudes are reflected through use. A response through paraphrase, or correction is indicative of a subject's attitude as he will respond with what he considers a nondeviant form. It is important to keep in mind
that results of use and attitude need not be the same. A subject may consider a stimulus sentence as deviant in a ranking and rating task as there would be a greater consciousness of "correctness" as well as comparison between other sentences presented to the subject.