EFFECTS OF AN INSTRUCTED MOTIVATIONAL SET TO DECEIVE ON INTERVIEWEES' SPEECH AND SILENCE BEHAVIOR

by

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A Thesis
Presented to the Department of Medical Psychology
and the Graduate Division of the University of Oregon Medical School
in partial fulfillment of
the requirements for the degree of
Master of Science

June 1969

APPROVED:

[redacted]

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ACKNOWLEDGEMENTS

I wish to thank Dr. Joseph D. Matarazzo for the helpful advice he gave me as my thesis advisor. I also wish to thank Drs. Ruth G. Matarazzo, Arthur N. Wiens, and Robert D. Fitzgerald for serving on my thesis committee and for providing their careful criticisms. My special thanks go to those two individuals who made this study possible by the long and patient hours they spent in helping me collect and analyze the date: Dr. Arthur N. Wiens and Mrs. Janet Kirkpatrick. I also wish to express my thanks to Mrs. Marie Boylston, who provided technical help, and to Mrs. Patricia Watkins, who assisted in the preparation of the manuscript. Thomas S. Manaugh received National Institutes of Health fellowship support from NIGMS Training Grant Number GM 1495-02. This research was carried out in conjunction with support from the office of Scientific Research, Office of Aerospace Research, United States Air Force, under AFOSR Grant Number XG-3057.

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INTRODUCTION

The challenge to reliably assess the presence of identifiable human attitudes, motivational states, and other personality characteristics, has attracted investigators in many branches of psychology since the turn of the present century. Development of such devices as questionnaires and objective and projective tests has, however, failed to provide indices of such attitudinal, motivational, and personality states with more than a modest degree of utility and common acceptance. This shortcoming has stimulated investigators to search for new techniques and measures -- especially for ones less dependent on an individual's ability and willingness to give valid self reports. One area of this search has been the attempt of many investigators to relate some aspect of behavior during an interview to the emotional or motivational state of the interviewee (e.g., anxiety, depression, affection, inhibition, candor, etc.). Some researchers have focused their attention on facial, postural, or gestural cues (Haggard and Isaacs, 1966; Scheflen, 1965; Condon, 1968). Others have concentrated their attention on what is said by the interviewee. (See reviews of content analysis of speech by Auld and Murray, 1955; Marsden, 1965). Still another area of research lies in how the participants in interpersonal communication speak (i.e., noncontent aspects of speech).

Until fairly recently the bulk of research relating noncontent aspects of speech to motivational state was principally demonstrative. That is, there were many studies showing that certain noncontent aspects of speech (e.g., pitch, timbre, stress, etc.) could communicate information about

the speaker when content was held constant. The typical paradigm for these studies involved measuring the accuracy by which judges could identify an emotion or attitude protrayed by coached speakers (see reviews by Kramer, 1963; Starkweather, 1961). Only in the past ten years or so has there been significant progress toward showing that attitudinal and emotional states are mirrored in the noncontent aspects of a person's speech. These findings are, of course, no surprise to clinicians who have long used such cues as speech rate, reaction times, and speech disfluencies in forming clinical judgments.

The study to be described here fits into this area, namely, motivational state and its reflection in noncontent aspects of speech. The specific question asked was whether temporal measures of speech could differentiate interviewees who had been given a motivational set to deceive from other interviewees who had not been given this set. The research design included subjects who were instructed to deceive their interviewer during part of an interview. Other (control) subjects were given neutral instructions.

The Reliability of Temporal Speech Measures

The rationale for this study was partly based on the fact that temporal aspects of an interviewee's speech tend to be stable within and across interviews when the interviewer's speech behavior is kept relatively constant. This has been shown most clearly in a series of studies by Matarazzo and his associates and summarized in Saslow and Matarazzo (1959) and in Wiens, Saslow and Matarazzo (1966). Saslow and Matarazzo (1959) summarized five such reliability studies for durations of utterance of interviewees. In these five

studies the investigators were concerned with the reliability across interviews when (a) one interviewer was used in test and retest interviews and also (b) when two different interviewers were used for test and retest interviews. The intervals between the test and retest interviews in these studies were: (1) 5 minutes; (2) 5 minutes (replication); (3) 7 days; (4) 5 weeks; and (5) 8 months.

The results of all five studies showed high reliability (stability) for interviewee duration of utterance from one interview to the next. For example, when data were correlated for two interviews conducted by the same interviewer five weeks apart, the authors found a Pearson r of .86 (p of .001) for the duration of utterance variable. Reliability of their second speech variable, reaction time latency, was similarly high.

In the later study Wiens, Saslow, and Matarazzo (1966) assessed the reliability of speech interruption behavior across two interviews (again five minutes to eight months apart) for the same five studies. They found the same high degree of stability in the rate of interruption between the two interviews for any given individual subject. Whether five minutes apart with two different interviewers or eight months apart with a single interviewer, the test-retest correlations for interrupting behavior were high, ranging from .56 to .80. Not only did the interviewees tend to keep the same relative position with regard to their interruption rates, but the absolute number of interruptions per interview tended to be stable across the two interviews.

In the five test-retest interview studies reviewed above the investigators had used a standardized interview which contained five different periods. Thus, it was possible to assess the intra-interview reliability across the five

periods of a single interview. For both duration of utterance and interruption rate, high intra-interview reliability was demonstrated. For example, when the number of interruptions in the first period of the interview was correlated with the number of interruptions in the other four periods combined, Wiens, Saslow, and Matarazzo found correlations ranging from .51 to .89. It should be noted that these high intra-interview correlations were based on relatively brief interview periods; the first period of their standardized interview was only 10 minutes long. Thus, an interviewee's characteristic interrupting speech behavior may be reliably measured during a relatively short interview period.

In 1967 Matarazzo and Wiens used a similar analysis to investigate the intra-interview stability of a slightly more precise measure of the reaction times of interviewees. This time using a standard three period interview, correlations between the three periods were found to range from .48 (p of .05) to .77 (p of .001). Test-retest correlations for reaction times between interviews were even higher (Saslow and Matarazzo, 1959). Dinoff, Morris, and Hannon (1963) independently repeated these various reliability studies and crossvalidated the results for duration of utterance and reaction time.

Because these temporal measures of speech are stable, it was reasoned in the present study that changes might serve as a reliable index of a change in motivational state. The present study was thus an attempt to experimentally induce a temporary motivational state (deception) in interviewees in order to assess changes in their speech which it was hoped would reflect this motivational state. The rationale for the hypothesis that such changes would reflect the motivational set to deceive was based on results in two lines of still

other previous research: (1) studies showing either differences in speech patterns across diagnostic groups or changes in speech patterns which are related to changes in mental or emotional state, and (2) studies showing differences or changes in speech patterns as a function of instructed motivational set. These studies will now be reviewed.

Differences in Speech Patterns Across Diagnostic Groups

Gottschalk, Gleser, and Hambridge (1957) compared several speech measures from a group of eleven psychiatric inpatients with measures from a matched group of eleven nonhospitalized subjects (no disabling personality disorder). Two five minute samples of speech were recorded for each subject: (1) subjects were asked to describe "any interesting or dramatic life experiences"; and (2) subjects were asked to tell stories about Thematic Apperception Test cards.

The primary emphasis of this study was upon content measures, but they also looked at several noncontent measures during the five minutes of describing life experiences. The only variable differentiating the two groups which approached significance was the number of words used per five minutes (p of .08). This difference was apparently due to the behavior of the psychotic patients in the sample who had long pauses (15 seconds or more) during the second, third, fourth and fifth minutes. The overall downward trend for the group was found to be significant (p of .01). This result was crossvalidated by a similar downward trend in speech rate for the TAT speech sample. No significant trends were found for the normal group; they spoke with constant mean

rates throughout their five-minute speech samples.

Several years later Matarazzo and Saslow (1961) reported finding differences in temporal speech measures among five diagnostic groups: 19 psychotics (chronic schizophrenics), 40 mixed neurotics and psychotics, 60 neurotics, 40 normals, and a second group of 17 normals. Each group was interviewed using a partially standardized interview with five periods. During the interviews the interviewer used utterances of approximately five seconds duration. Following an interviewee's completed utterance the interviewer responded within one second except during the second period (stress), when he would not respond until 15 seconds had elapsed. The interviewer was instructed to avoid interrupting the subject except during the fourth period (stress), when the interviewer was to interrupt every one of the interviewee's utterances. Matarazzo and Saslow, looking at 12 speech measures derived from each interview, found that there were significant overall differences (p of .05 at most) across the groups on eleven of the variables. When comparisons were made for one group with every other group, a large number of significant differences were found between and among the patient groups themselves, and between each of the patient groups and the normal groups. One of the variables which most strikingly differentiated groups was the subject's mean duration of utterance. It was found that subjects in the normal groups spoke, on the average, two to four times longer than subjects in the patient groups.

Dinoff, Patterson, Hannon, and Morris (1967) followed up and largely replicated the study by Matarazzo and Saslow. They found statistically reliable differences between subjects in the following nosological groups: 19

normals, 20 nonmedicated schizophrenics, and 28 regressed schizophrenics. Using a five-period standardized interview almost identical to that used by Matarazzo and Saslow, they looked at the following variables:

(1) subject's units (number of utterances),

(2) interviewer's units (number of interviewer's utterances),

(3) subject's action (mean duration of utterance),

(4) subject's silence (mean reaction time latency),

(5) total time (the total interview time),

(6) absolute silence (total interview time less the total of the interviewer's time plus the subject's time divided by the interviewer's time plus the subject's units), and

(7) the interviewer's required initiations (the number of times that the subject failed to respond and the interviewer was forced to follow himself in speech).

When an analysis of variance was performed on each of the above variables over the entire interview, a significant F (p of .05 at most) was found with every variable but the subject's actions[1]. In every case the mean scores for normal subjects were at one end of the continuum and regressed schizophrenics at the other; nonmedicated schizophrenics had intermediate scores.

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[1]Three significant F-values, however, were found for S's action when the same analysis was performed for three of the five individual periods within the interview. Significant F's were not found for the two "stress" periods in the standardized interview -- the periods when the interviewer either did not respond for 15 seconds following the interviewee's utterances or interrupted each of the interviewee's utterances.

The above studies indicate that temporal speech patterns have considerable potential as indices of a speaker's mental state. A related line of research, furthermore, indicates that changes in temporal aspects of speech may be related to changes in the emotional or motivational state of interviewees. Starkweather (1967), for example, found that certain changes in speech behavior distinguished recovered from retarded depressed patients. When patients were interviewed on several occasions, it was found that they spoke with longer durations of utterance and shorter reaction times on those occasions when they were rated (clinically) as not depressed.

A study by Kanfer (1959) with normals indicates that changes in temporal speech patterns may be related to the changed emotional state associated with the introduction of disturbing topic material. In this study 20 male and female college students were interviewed regarding five different content topics (their family, self-confidence, achievement, sex, and emotional maturity). An independent judge rated each subject for level of "adjustment" in the five life areas covered during the structured interview. It was found that higher word rate was associated with topics in which the subjects were rated as poorly adjusted. Somewhat related to this study was one performed by Pope and Siegman (1965) using 50 nursing students. They found that introduction of an anxiety-provoking topic lead to significantly greater productivity (number of words spoken) in this topic area. A study by Kasl and Mahl (1965) also demonstrated that anxiety could affect temporal aspects of speech. Twenty-five college students were interviewed during two different sessions, the second of which was anxiety-provoking. Twenty-four of the twenty-five subjects showed an increase in

"non-ah" speech disturbances between the two sessions (p of .001). Only 12 of 20 control subjects, who had a neutral second session, showed any increase in speech disturbances (p not significant).

Speech Patterns Following an Instruction-Induced Motivational Set

In a study by Allen, Wiens, Weitman, and Saslow (1965) two different groups of interviewees (job applicants) were given instructions that they would be interviewed by (a) a "warm" interviewer, or (b) by a "cold" interviewer. It was found that the different preinterview "sets" given the interviewees resulted in the cold-set group having significantly longer response latencies than the warm-set group (1.25 seconds versus .91 seconds, p of .01). No significant difference, however, was found in the mean duration of interviewee's utterances (30.6 seconds versus 28.4 seconds). In a related study by Pope and Seigman (1968), nursing students were interviewed twice, once by an interviewer described as "warm and accepting" and once by an interviewer described as "cold and distant". Significantly greater verbal productivity (85.6 versus 59.2 words per speech unit response) was found during the warm-set interview. This finding does not, however, contradict the finding by Allen et al. that verbal productivity was not affected by an instruction-induced warm versus cold set. Interviewers in Pope and Seigman's warm interview (only) were instructed to nod their heads. Differences as great as those found by their presumed warm-set alone can be explained by the effects of headnodding alone since Matarazzo, Saslow, Wiens, Weitman, and Allen (1964) found that interviewees increased their mean durations of utterance by about 50% on the average

when an interviewer nodded his head during part of an interview.

Most clearly related to the study to be presented here is one by Exline, Gray, and Schuette (1965). Though their primary interest lay in interviewee to interviewer gaze behavior, part of their design included a measure of verbal productivity (total interview time in seconds). Exline et al. were interested in the effects of content, concealment instructions, and sex of partner upon the amount of time college students engaged in mutual glances. Content was varied by having the interviewers question 40 subjects about personal and embarassing topics while another 40 were asked innocuous questions about recreational interests. Half of the subjects in each content condition were instructed to "....conceal their true feelings and opinions.....to conceal as much as possible from the interviewer". Sex was varied by having one female and one male interviewer each interview 20 male and 20 female subjects (counterbalanced for content and concealment). It was found that subjects, when speaking, looked significantly more at the interviewer during the innocuous interviews than did the subjects being interviewed about personal embarassing topics. In addition, female subjects were found to look significantly more regardless of the interviewer's sex. Surprisingly, the gaze behavior of subjects instructed to conceal was not significantly different from those who did not get concealment instructions. The mean percentage of mutual gaze time during the interview for the 40 conceal subjects was 47.7 versus 47.0 percent for the 40 nonconceal subjects.

Concealment instructions did, however, affect the length of the interviews. Durations of interviews with subjects asked to conceal lasted a mean of 314.0 seconds, while interviews with subjects asked not to conceal

lasted 397.1 seconds (p of .01). This difference does not appear to reflect longer or more numerous periods of silence. Mean percentage of silence time for conceal subjects was 13.6 versus 11.9 for no-conceal subjects (p not significant). Furthermore, this difference can probably not be attributed to the interviewers asking more numerous or longer questions. There is, however, some ambiquity on this point. Though interviewers worked from a standard list of questions, they also used "probes". There was no indication, however, that "probes" were used more or less often with conceal subjects. Given that silences and interviewer's behavior did not differentially affect interview length, it appears that subject's verbal productivity was negatively influenced by the instructed motivational set to conceal. This would fit in with a popular cultural stereotype that speakers intent upon concealing or otherwise deceiving decrease their total contact time (e.g., a child being questioned by his mother, one spouse questioning another, etc.).

The studies reviewed in the above three sections provide a background for the hypothesis that an instructed motivational set to deceive would reflect itself in temporal aspects of speech. Just as patient groups differ from normals, so might a group of subjects with a motivational set to deceive differ from a "neutral" group. Just an an interviewee's speech, that is usually constant, changes as he becomes anxious, so might his speech change as he is required to lie. Just as an interviewee's speech is different when he has been instructed to conceal, so might his speech be different when he is instructed to deceive.

Deception and Temporal Aspects of Speech

The literature on detection of deception (or guilt) is of little help in formulating specific hypotheses as to how the motivation to deceive might affect temporal aspects of speech during interviews. Some early work along these lines was done, however, during the 1920's and 1930's. During the 1920's there was some interest in the possibility that the reaction times of verbal responses could be used to detect deception. One paradigm used was that developed by Marston (1920). In this study subjects were required to respond in two different ways when presented with a series of simple arithmetic operations. On some series subjects were to follow the instructions of the experimenter while on others they were to "deceive" him by not following his instructions. No consistent differences in reaction times were found as a function of series. Some subjects took longer to respond on "deception" series; others took a shorter time to respond. English (1926), using a similar procedure, got the same mixed results.

In 1925 Marston reported briefly upon an experiment in which two students were instructed to commit "crimes". Later a word association test was conducted and reaction times were recorded with a stopwatch. Marston reported that the reaction times for the student on the crucial words (those relating to the crime) were "clearly negative" (i.e., shorter). The reaction times of the other student were "slightly negative". Two other non-involved students had slightly positive reaction times to the crucial words.

Winter (1936) used the word association technique in an attempt to identify an actual thief in a college dormitory. Each of the 25 girls in the dormi-

tory was asked to give associations to a list of words, some of which related to the thefts. From the data presented by Winter it was obvious that the actual thief (who later confessed) could not be detected by her reaction times.

It can be seen from the above review that studies on the effect of deception, guilt, or related motivational states on verbal reaction times are rather unclear and have produced no very striking results. It is, therefore, not possible to extrapolate from this prior research in order to arrive at an hypothesis about the effect of a set to deceive upon interviewees' reaction times. Furthermore, common-sense notions, based on the experiences of each of us about how people act when they attempt to deceive, are far from clear-cut. For example, some individuals might expect the deceiver to react quickly through "nervousness", whereas others might expect him to react slowly because of extra time needed to compose an answer.

Some support for the latter hypothesis is found in the study by Goldman-Eisler (1961) in which she found a relationship between pauses during spontaneous speech and the amount and kind of information being transmitted. She reported that ".....pauses not only anticipate a sudden increase in information but that their interpolation is a necessary condition for such an increase" (p. 163). Additional support is offered in a study by Siegman and Pope (1965) which showed that "nervousness" may lead to longer reaction times rather than shorter. In this study 50 nursing students were interviewed on two topics which were counterbalanced for order. It was found that reaction times across the total interview were significantly longer when the anxiety-provoking topic appeared first in the interview. Siegman and Pope reasoned that this was due to a persisting

anxiety in the second period for the 25 interviewees who were questioned about the anxiety-provoking topic first.

Because the early studies on detection of deception by Marston and others produced no conclusive results, they were of little help in forming specific hypotheses for the present study. The later studies by Goldman-Eisler and Siegman and Pope, on the other hand, suggested one hypothesis for the present study; namely that the interviewee who attempts to deceive may respond with longer reaction times either because of his need to generate new information or because of greater anxiety.

With regard to the duration of an interviewee's utterances, it might be expected that the interviewee would be less likely to elaborate on those topics on which his deception might be detected. This notion is lent credence by the Exline, Gray, and Schuette (1965) study in which instruction to conceal resulted in less overall verbal productivity. On the other hand, deception may be quite different from concealment. In order to conceal one may only refuse to reveal. That is, one may simply (and passively) not answer, not answer fully, or not elaborate in his answers. Deception, however, quite probably demands more active participation. The individual must not only fail to respond accurately, but he must in addition respond with plausible lies. Anxiety about lying or about being caught in a lie could also play a part in the duration of utterance. Pope and Siegman (1965) did, in fact, find that introduction of anxiety-provoking topics led to greater verbal productivity.

Though the studies by Exline et al. and Pope and Siegman do show that motivational state can affect verbal productivity, no one hypothesis can be

derived from their results. Deception could be expected to result in shorter utterances to the extent that deception is like concealment. On the other hand, utterance durations could be expected to be longer to the extent that the motivation to deceive involves anxiety. For these reasons it was concluded that no clear-cut hypothesis could be tested as to the effect of motivation to deceive on durations of interviewee utterance. For related reasons it was difficult to predict what effect the motivation to deceive would have on interruption frequency. Past research has shown that higher status nursing administrators interrupted an interviewer in a significantly greater percentage of their utterances than did lower status staff nurses (Wiens, Matarazzo, Saslow, Thompson, and Matarazzo, 1965). In another study Molde and Wiens (1968) found that task-oriented nurses (e.g., surgical nurses) interrupted significantly more often than person-oriented nurses (e.g., psychiatric nurses). Though these studies indicate that interruption behavior may be affected by status or attitudinal variables, no studies have appeared that seem directly relevant to the motivation to deceive. Therefore, no specific hypothesis was made as to the effect of motivation to deceive on interruption behavior.

In summary, the studies cited in preceding sections indicate that, though temporal aspects of speech tend to be stable under constant conditions, they may be modified by the attitudinal, emotional, or motivational state of the speaker. The purpose of the present study was to investigate the effects of an instruction-induced motivational set to deceive on the temporal aspects of interviewees' speech behavior. It was hypothesized that the motivation to deceive would result in longer reaction times. No specific hypothesis was made

as to the effect of instructions to deceive on the durations of interviewees' utterances or the frequency of their interruptions. For these speech variables it was hoped the present study would clarify some of the ambiquity in the disparate results of prior investigators.

METHOD

Dependent Variables

Of primary interest in this study were the following three temporal measures of interviewee speech:

(1) Reaction Time Latency: the mean length of time in seconds separating the termination of a question by the interviewer and the beginning of the interviewee's response to the question.

(2) Duration of Utterance: the mean length of time used by the interviewee in responding to the interviewer's questions.

(3) Interruption: any occurrance of simultaneous speech in which the interviewee begins speaking before the interviewer has completed his utterance.

Reaction times, utterance durations, and interruptions were recorded during the interview in a manner described under Observer, below. Identical measures of these three variables were recorded for the interviewer.

Independent Variables

The independent variable in this study was a set of instructions, given individually to each member of a group of college students, to attempt to deceive an interviewer about his number of years of education. Prior to their interview each subject was asked to attempt to convince an interviewer that he had completed one more year of college than he actually had completed. (See Appendix A for text of Lie instructions). For individuals in this group (Group A),

it was of interest to determine if their speech patterns would change as they were first questioned about a neutral topic, then about their college education, and finally about another neutral topic.

Prior pilot research by Matarazzo, Weitman, and Saslow (1963) suggested that the topic of an interview would probably not, by itself, affect interviewee's temporal speech patterns. They found no significant differences in durations of utterance between topic periods when interviewees were questioned about (1) their family background, (2) their occupation, and (3) their education. However, in the study by Matarazzo, Weitman, and Saslow topics were counterbalanced for order. In the study reported here topics were not counterbalanced for order; all subjects were questioned about their college education during the middle period of a three period interview. It thus appeared necessary to include a second group (Group B) to control for effects of order and also any possible effects due to topic alone. Subjects in Group B were treated exactly like subjects in Group A except that instead of instructions to lie, they were given neutral (time filler) instructions. (See Appendix B for text of Neutral instructions). Group B, then, served as a control for Group A. If changes in speech behavior were found across periods for Group A, but not for Group B, it could be concluded that these changes were due to instructions to lie and not to simple order or topic effects.

Several other considerations led to the inclusion of two additional groups in the experimental design -- a second group instructed to lie (Group C) and another group given neutral instructions (Group D). Group C matched Group A except for the time at which (the same) instructions to lie were given. Group

C subjects were given instructions to lie in the middle of the interview, just after being interviewed about a neutral topic and just before being interviewed about their college education. Similarly, subjects in Group D also received instructions in the middle of the interview, just prior to questions about college education. Group D, however, received neutral instructions (the same time-filler instructions received by subjects in Group B). The time sequence of instructions and interview topics is summarized in Table 1.

It was expected that any effects of the experimentally-induced set to deceive would be most apparent during the second period of the interview when the instructions to lie were most relevant, i.e., when the topic of college education would elicit lying. There was, however, the possibility that the set to lie would not simply lie dormant during the first and third topic periods which were not relevant to the lie instructions. That is, it may have been the case that the set to deceive would have affected the speech behavior of the interviewee even during those periods when the topic did not require lying. A test for a "general" (i.e., topic-independent) effect was made possible by the different times at which instructions to deceive were given to Groups A and C. It was reasoned that if the set to deceive did have a general effect, then differences would be found between measures from the first period for Group A (which got instructions to lie before the first period) and measures from the first period of Group C (which got instructions to lie after the first period).

Because instructions to deceive came just prior to the start of the interview in the case of Group A, the interviewees were not immediately required (by topic area) to lie. Instead, they were first questioned about a neutral topic.

Table 1. The Temporal Sequence of Instructions and Interview Topic Periods

	Point in Time			
Group A	(Lie Instructions)	Family	Education	Occupation
Group B	(Neutral Instructions)	Family	Education	Occupation
Group C	Family	(Lie Instructions)	Education	Occupation
Group D	Family	(Neutral Instructions)	Education	Occupation

Therefore, interviewees had some opportunity to prepare themselves to deceive. In the case of Group C, however, the topic of college education was introduced immediately after instructions to lie were given. Inclusion of Group C, therefore, allowed a test of the effect of preparation time on any changes in speech behavior that resulted as a function of the set to deceive. That is, if changes in speech behavior were found to result from instructions to deceive, it would have been possible, to some extent, to test for the effect of preparation time by comparing the magnitude of change in Group A versus that in Group C.

In Group C the interview was interrupted in order to give lie instructions just prior to questioning about college education. Because of the possibility that the interruption alone could have caused differences between the preceding neutral period and subsequent deception period, Group D was also given instructions (neutral ones) during the interruption of the interview. If changes had been found across periods in the case of Group C, then they could not have been ascribed to the interruption unless comparable changes were also found for Group D. Thus, Group D acted as a control for possible effects of interrupting the interview for instructions to be given.

One additional reason for the inclusion of Groups C and D in the design was that giving instructions in the middle of the interview allowed for an uncontaminated baseline period. Because no instructions were given to them prior to the initial neutral topic period, subjects in Group C and D were treated exactly alike during the initial period. Measures taken from this initial period could, thus, be used to check the assumption that random assignment of subjects had actually produced groups that were comparable in their speech characteristics.

In summary, four groups of subjects were interviewed. The first two groups (A and B) received instructions prior to the start of the interview. Subjects in Group A received instructions to lie about the number of years of their college education which they had completed. Subjects in Group B, controls for Group A, were given neutral (time-filler) instructions prior to the interview.

The additional two groups (C and D) received instructions after a baseline period in the interview. That is, the instructions were interspersed. Group C received lie instructions, and Group D received neutral instructions.

The experimental design allowed tests on the following points via comparisons across periods of the interview and/or comparisons between groups:

(1) the effect of instructions to lie when the interviewee was required to lie by the topic,

(2) the effect of instructions to lie when the topic was not one requiring lies,

(3) the effect of neutral instructions,

(4) the effect of time for preparation when interviewees were asked to lie,

(5) the effect of interrupting the interview to give instructions, and

(6) the assumption that groups were comparable prior to instructions.

Subjects

Male college students between the ages of 18 and 29 were recruited from local colleges. They were told that they would be paid three dollars for

serving as subjects in research "oriented toward finding out how different kinds of people behave in a standard interview situation." They were told they would take a battery of personality tests and be given a short interview, the total procedure requiring about two and one-half hours.

It was planned that personality and biographical data would be correlated with measures of speech characteristics from the interview. Upon arrival each subject was given a personal data questionnaire to fill out. He was next given a Maudsley Personality Inventory and a short test of mental ability, the Shipley-Hartford. A final test, the Minnesota Multiphasic Personality Inventory, was given after the interview except in the case where scheduling of subjects made it necessary that a subject begin it prior to the interview. This latter change occurred randomly across the four groups.

At the completion of the interview subjects were asked to fill out two post-experimental questionnaires. For the first questionnaire (see Appendix C) subjects were asked:

(1) to write down what instructions they had received as to how they were to answer questions during the interview,

(2) to rate themselves as to how hard they had tried to follow those instructions, and

(3) to rate themselves as to how well they thought they had followed those instructions.

After completing the first questionnaire, subjects were given the second questionnaire – a blank sheet of paper except for two statements to be completed: "The purpose of this experimental interview was" and "My evidence

is:". This second questionnaire served as a check on random "self instructions" which a subject might give himself as to the "real" purpose of the study.

Subjects were assigned to groups in such a way that all could claim (truly or not) that they had at least one year of college but had not yet graduated. They were, furthermore, assigned so that mean ages and years of college would be comparable across groups. Twenty subjects were assigned to each of the four groups, making 80 in all.

The Interview

Though temporal aspects of an interviewee's speech have been found to be remarkably stable, research has shown that an interviewer may powerfully affect these measures by changes in either his verbal or nonverbal behavior. Matarazzo, Saslow, and Wiens (1965) have demonstrated that the interviewer can increase an interviewee's duration of utterance by increasing his own duration of utterance or by saying "Mm-Hmm" during the interviewee's utterance. Similarly, marked increases in interviewee reaction time have been shown to result when the interviewer increases his own reaction time (Matarazzo and Wiens, 1967). Increased interruptions by the interviewer cause the interviewee also to interrupt more (Wiens, Saslow and Matarazzo, 1966).

Two other studies have shown that interviewers' nonverbal behavior may affect interviewee utterances. Leach (1966) found that three out of eight mentally retarded children spoke significantly longer when the experimenter used intermittant eye contact rather than either continuous or no eye contact. Matarazzo, Saslow, Wiens, Weitman, and Allen (1964) found that interviewees

would speak in longer utterances when the interviewer would nod his head during the interviewees' utterances.

From these studies on modification of temporal aspects of speech it is clear that the interviewer can powerfully affect temporal aspects of interviewees' speech. It was, therefore, extremely important in this study that the interviewer (TM) should behave in the same manner when interviewing experimental subjects as when interviewing control subjects. Two methods were utilized to achieve this aim: (1) the interviewer remained unaware of whether the S had received lie or neutral instructions, and (2) the interviewer attempted to standardize his behavior across interviews.

In order that the interviewer would remain unaware of the instructions given to the Ss, he was absent from the interview room during the time when subjects were given instructions. Instructions were given by a research associate who had no part in the interviewing of subjects or collecting data. This control was necessary because of the ease by which the experimenter-interviewer could unconsciously bias the results. That such biasing is possible has been amply demonstrated by Rosenthal (1966) in experiments where subjects presumably were less subject to experimenter control than the interviewees in this study.

So as to standardize his behavior across the interviews, the interviewer regulated his behavior as follows:

(1) The interviewer asked standard questions in standard sequence with utterance durations of five seconds. (See below for description of standard questions.)

(2) When subjects finished an utterance, the interviewer asked his next question with a response latency of under one second.

(3) The interviewer gazed unself-consciously and naturally at subjects except for brief glances at a prompter sheet, which was out of the subject's view.

(4) Questions were asked in a vocally communicative manner (not mechanically).

(5) When a subject asked that a question be clarified, the interviewer avoided going "off schedule" by saying something like, "Well, that's not too important...." and then asking the next question.

(6) When subjects asked that a question be repeated, the interviewer repeated the question once.

(7) The interviewer did not interrupt the subject.

The above procedures were all aimed toward eliminating any systematic bias caused by the interviewer's behavior. These procedures were also developed to help reduce the amount of random differences between interviews. Differences due to instructions, if any, would then be less likely to be masked by large random experimental error.

One additional procedure was used to help standardize interviews; namely, the use of 45 standard questions, 15 in each of the three content areas. Matarazzo, Weitman, and Saslow (1963) did not find significant differences in utterance duration across topics (family, education, and occupation) when job applicants were interviewed. Other research, however, including currently

ongoing research in our laboratory, has shown that certain content variables can influence verbal productivity. Pope and Siegman (1965) found that either decreasing the specificity of questions or introducing anxiety-provoking topics would elicit greater verbal productivity (number of words). In order to reduce or eliminate interviewee speech variations across periods resulting from these variables, the 45 standard questions were all designed so that they were not obviously anxiety-provoking. Questions across content areas were, furthermore, matched so as to be comparable in their presumed specificity, open-endedness, difficulty, and length.

Only the second content period (college education) was designed to be relevant to the lie instructions. In this period, then, questions were designed to have a high probability of eliciting deception from subjects with that set. Questions in the first and third (nondeception) periods were, on the other hand, designed to have a low probability of eliciting lies from subjects with a set to deceive. (See Appendix D for the text of the 45 questions asked in each interview.)

At the completion of the interview, the interviewer handed each subject the first post-experimental questionnaire (Appendix C) saying, "Here is a questionnaire we would like you to fill out. I won't look at it when you are done." When the subject finished the first questionnaire, the interviewer handed him the second one, saying: "And one more along the same lines."

While the subject filled out his questionnaires, the interviewer wrote down his guess as to whether or not the subject had attempted to deceive him. He also recorded inconsistencies (if any) in the subject's answers, comments

on the subject, and comments on his own behavior during the interview.

Instructing the Subjects

Subjects in Groups A and B were given instructions prior to the start of the interview. They were brought into the interview room by a research associate[2] who did not participate in collecting data from the interview or in interviewing. She handed the subject a sheet of paper and said: "Here are some instructions that we would like you to follow during the interview." Subjects in Group A received instructions asking them to attempt to make the interviewer believe that they had received one more year of schooling than they actually had. Subjects in Group B received instructions asking them to answer questions "just at you would in any interview situation -- for example, when applying for a job." No additional information was given about the interview beyond a restatement of the information contained in the instruction sheet. After making sure that each subject understood the instructions, the research associate left the room and the interviewer entered.

Subjects in Groups C and D were given instructions only after period 1 (family and early background) had been completed by the interviewer. With these subjects the interviewer conducted the subject to the interview room and stated prior to the start of the interview that "Mrs. _____ will want to give you some instructions later, but first I'm going to ask you some questions." After the subject completed answering the same standard questions in period 1

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[2]Either Mrs. Janet Kirkpatrick or Mrs. Marie Boylston

as those asked Groups A and B, the interviewer said: "O.K., I'll go see if Mrs. _____ is ready now. Why don't you wait here and I'll be back in a minute." The research associate entered shortly after the interviewer left the room. After giving the instructional set as above, she left the room and the interviewer returned and then resumed the interview with period 2.

The Observer

The observer[3] recorded the interviewer's and interviewee's speech behavior for all subjects. He activated an automatic recording device while observing and listening to the interviews through a one-way vision mirror. The recording device, the Interaction Recorder (Wiens, Matarazzo, and Saslow, 1965), is designed to automatically record durations of interview speech and silence as the observer depresses two keys. One key, when depressed, records when the interviewer is speaking, while the other key, when depressed, indicates that the interviewee is speaking. When both keys are depressed, an interruption occurence is recorded. All the above information is automatically punched into IBM-compatible paper tape at the time the interview is in progress and is processed by an IBM computer following the interview.

In order to avoid any unconscious bias in recording, the observer also was kept unaware of the instructions given to individual subjects. At the end of the interview the observer, like the interviewer, recorded his guess as to whether or not the subject had attempted to deceive. In addition, he also

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[3]Arthur N. Wiens, Ph.D.

wrote down the year in school (freshman, sophomore, etc.) in which the subject claimed to be enrolled.

RESULTS

In this section the results relating to changes across periods and to differences among groups are presented in separate subsections for each dependent variable. In the subsections relating to reaction time latency and duration of utterance the data units are mean times in seconds in each period for each subject. Thus, for example, in assessing the change in reaction times across the three periods for Group A, 60 scores are used in the analysis -- the mean reaction times in seconds for each of 20 subjects for each of the three periods of the interview. The same is true for the duration of utterance variable; 20 scores in each of the three periods, making 60 in all in the analysis of the data for each of the groups.

It was found that there was a low rate of interrupting during every interview period for each group; the median score for number of interviewee interruptions in every case but one was equal to 0. For example, in Group A, period 1, one subject interrupted 4 times, one subject interrupted 3 times, four subjects interrupted once, and 14 subjects did not interrupt. In order to best reflect the essentially dichotomous nature of these data, it was decided that the unit of analysis for interruption behavior should be the number of subjects in each period who interrupted one or more times.

The final subsection summarizes the results of computing the correlations between the measures of interview speech behavior and certain test and questionnaire data.

Reaction Time Latency

It can be seen from inspection of Table 2 that the group means of individual subjects' mean reaction time latencies were uniformly lowest during the second topic period (college education). An analysis of variance was performed to test for effects of instructions across the four groups and for effects of topic periods (Winer, 1962, pp. 302-312). Because a significant interaction was found between instructions and topic periods ($F=3.16$, $df=6/152$, p of .05), the analysis was extended to test for simple effects. The results of this analysis (F values for changes across topic periods and for differences between groups within a topic period) are included in Table 2. Where F values were found to be significant, the Newman-Keuls method (Winer, 1962, pp. 309-310) was used to identify where the significance lay. The results of these tests are also included in Table 2.

As shown in Table 2, a significant F value was found for topic period effects in Groups A, B, and C, but not in Group D, which accounts for the significant interaction of instructions by topic period. In spite of the interaction, all four groups showed the same pattern across periods, as can be seen in Table 2 and, graphically, in Figure 1.

When the Newman-Keuls method was used to check for the significance of shorter mean latencies during period 2, it was found, as shown in Table 2, that latencies were significantly shorter (p of .05 at most) in period 2 than in period 3 for Groups A, B, and C. Furthermore, in Groups A and B latencies during period 2 were significantly shorter (p of .01) than latencies in period 1. There was a tendency in Groups A, C, and D for latencies to be longer in period

Table 2. Mean Reaction Time Latency in Seconds Across Periods for Four Groups of Subjects, 20 Subjects In Each Group

Instruction Groups	Mean Reaction Time Latency in Seconds				Significance Levels For Tests of Means Using the Newman-Keuls Procedure		
	Topic Period 1 (Family)	Topic Period 2 (Education)	Topic Period 3 (Occupation)	F Values	1 vs 2	1 vs 3	2 vs 3
Group A (Lie Instructions first)	3.06	2.19	3.29	10.90**	.01		.01
Group B (Neutral Instructions first)	2.84	1.85	2.49	8.23**	.01		.05
Group C (Lie Instructions Middle)	2.26	2.03	3.26	13.86**		.01	.01
Group D (Neutral Instructions Middle)	2.34	2.10	2.64	2.39			
F Values	1.68	.22	1.90				

**p of .01

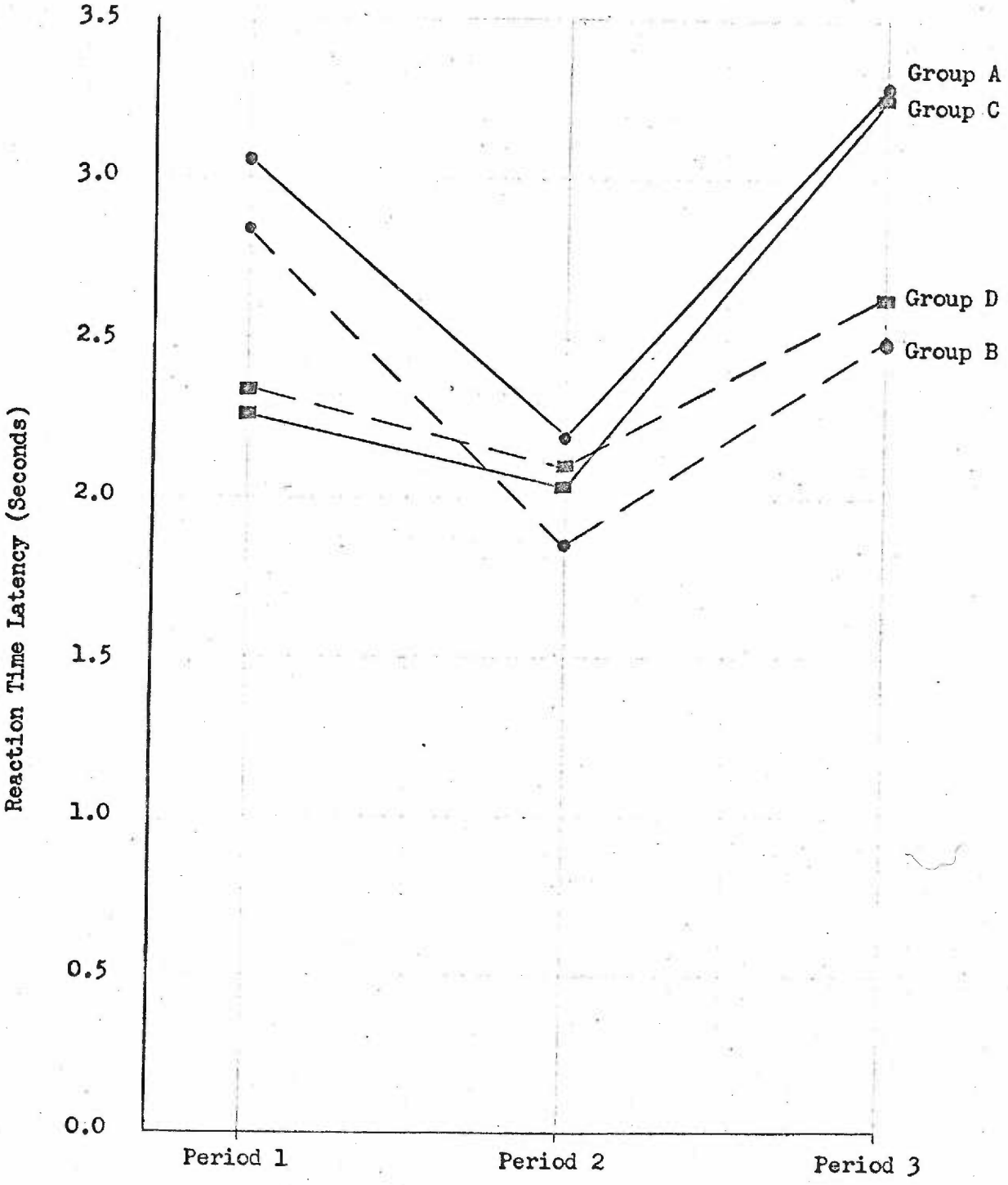
3 than in period 1. The difference was significant, however, only for Group C.

The F values computed for effects of instructions within each period were uniformly not significant. This indicates that groups not only showed a similar pattern across periods, but that the magnitude of latencies within each period also failed in every case to differentiate groups (see bottom row of Table 2).

The hypothesis that reaction time latencies would be longer for subjects instructed to deceive was, thus, not confirmed. In no period of the interview was there a significant difference between those instructed to lie and those getting neutral instructions. It had been expected that instructions to deceive would cause subjects in the two lie groups (A and C) to increase their latencies during the instruction-relevant period 2. Just the opposite occurred: latencies were shorter (which was also the case with the neutral instruction control groups B and D). Had the two neutral-instruction control groups (B and D) not been included in the experimental design, it would have been easy to arrive at erroneous conclusions from the results of Groups A and C. It might have been concluded the set to deceive had in fact affected interviewees' reaction times. That is, the shortened reaction times during the topic period of college education in lie groups A and C might have been attributed to the effects of the set to deceive about college education (even though lengthtened reaction times had been hypothesized). The comparable changes that were found in control Groups B and D, however, disallowed any such conclusion.. Rather, some other explanation was needed to account for the changes in reaction times which were found in both experimental and control groups.

In summary, then, it was found that instructions to lie had no

Figure 1. The Average of Mean Reaction Time Latencies across Three Interview Periods for Two Deception Groups (A and C) and Two Neutral Groups (B and D), 20 Subjects per Group.


3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Reaction Time Latency (Seconds)
Group A
Group C
Group D
Group B
Period 1
Period 2
Period 3

significant differential effect across groups on subjects' reaction time latencies. Though changes were found in reaction times across content periods (shorter latencies during the second period), the pattern of these changes did not differentiate subjects given a motivational set to deceive from those not given such a motivational set. Furthermore, in an across groups comparison, it was found that groups did not differ in magnitude of reaction time latencies during any topic period.

Duration of Utterance

The surprising results found with regard to reaction time latencies were also found with regard to durations of utterance. Briefly stated, all groups again showed a similar change across content periods, and no significant differences were found between groups when means were compared for each of the three periods individually. Inspection of Table 3 will show that mean duration of utterance in each group tended to increase from period 1 to period 2. These increases were then maintained through period 3. An analysis of variance was performed to test for effects of instructions and for effects of topic periods. No significant main effect of instructions was found ($F=.85$, $df=3/76$, p not significant). The changes in groups' mean durations of utterance which occurred across periods were, however, found to be significant; the main effect of topic periods ($F= 22.26$, $df= 2/152$) was significant at p of .01. Because there was no significant interaction between instructions and topic period factors, an extension of the analysis to simple effects was not required. For purposes of further inquiry into the sensitivity and characteristics of this measure, however, these F values

were computed and are shown along with group mean scores in Table 3. It can be seen from inspection of Table 3 and Figure 2 that each group, both experimental and control, had its shortest mean duration of utterance during the first topic period of the interview (family and early background). In all groups mean durations of utterance were significantly shorter in period 1 than in period 2 (p of .05 in each case). Furthermore, in Groups A, C, and D durations were significantly shorter in period 1 than in period 3 (p of .01 in each case). No significant changes in durations of utterance occurred between period 2 and period 3.

That the instruction-induced motivational set had no effect was determined by the nonsignificant F value found for main effect of instructions. This is also shown by the nonsignificant F values for instruction effects in each topic period, shown in Table 3 (bottom row). Though no specific hypothesis was made as to what effect instructions to deceive might have on duration of utterance, it had been expected that some differences would arise. This was, however, not the case. As with reaction time latency, mean magnitude of utterance durations did not differentiate lie instruction groups from neutral instruction groups. Nor were groups differentiated by different patterns of change across topics. Lie groups as well as control groups showed an increased duration of utterance between the first and second period, and this increase was maintained in the third period.

Interruptions

Analysis of this variable revealed that subjects, regardless of which group they were in, tended not to interrupt. The total number of interruptions recorded for all 80 subjects was only 109. Out of 3815 utterances recorded

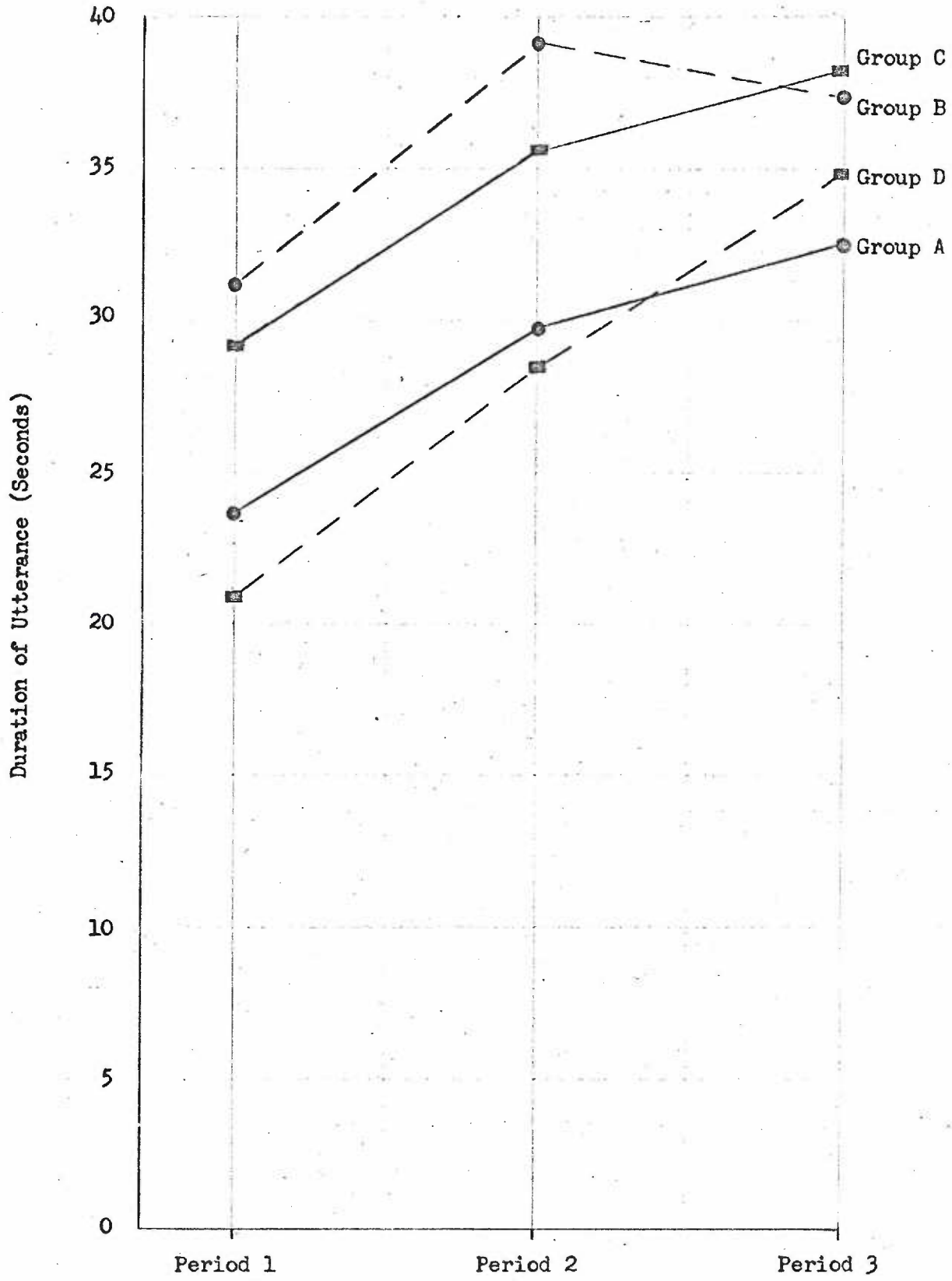
Table 3. Mean Duration of Utterance in Seconds Across Periods for Four Groups of Subjects, 20 Subjects in Each Group

Instruction Groups	Mean Duration of Utterance in Seconds: Topic Period 1 (Family)	Topic Period 2 (Education)	Topic Period 3 (Occupation)	F Values	Significance Levels For Tests of Means Using the Newman-Keuls Procedure: 1 vs 2	1 vs 3	2 vs 3
Group A (Lie Instructions first)	23.6	29.8	32.5	4.75*	.05	.01	
Group B (Neutral Instructions first)	31.2	39.1	37.4	4.02*	.05		
Group C (lie Instructions middle)	29.1	35.7	38.1	4.97**	.05	.01	
Group D (Neutral Instructions middle)	20.8	28.4	34.9	11.64**	.05	.01	
F Values	1.10	1.21	.31				

* p of .05

** p of .01

Figure 2. The Average of Mean Durations of Utterance Across Three Interview Periods for Two Deception Groups (A and C) and Two Neutral Groups (B and D), 20 Subjects per Group.


40
35
30
25
20
15
10
5
0
Duration of Utterance (Seconds)
Group C
Group B
Group D
Group A
Period 1
Period 2
Period 3

for the 80 subjects, then, only about 3 percent were interruptions. The total number of subjects who interrupted one or more times during their interviews was only 45 (out of a possible 80).

Table 4 shows period-by-period frequencies of the number of subjects in each group who interrupted the interviewer one or more times during the interview periods. It can be seen by inspection of this table that the four groups apparently did not differ one from the other in the number of subjects who interrupted. This observation was confirmed by a chi-square value computed from the chi-square test for k independent samples (Siegel, 1956, pp. 175-179). A nonsignificant chi-square value (1.47) indicated that groups did not differ with respect to the frequency of subjects who interrupted.

Though groups were not found to differ in the number who interrupted, consistent differences were found across interview periods. In all four groups more subjects interrupted in period 2 than in period 1 or 3. Furthermore, period 3 always had the fewest number of subjects who interrupted. That all four groups showed this same pattern can readily be seen by inspection of Figure 3.

Chi-square values[4] were computed for each group to test for the significance of changes in the number of subjects who interrupted across periods of the interview. These values are included in Table 4. It can be seen from Table 4 that in each group differences in the number of subjects who interrupted

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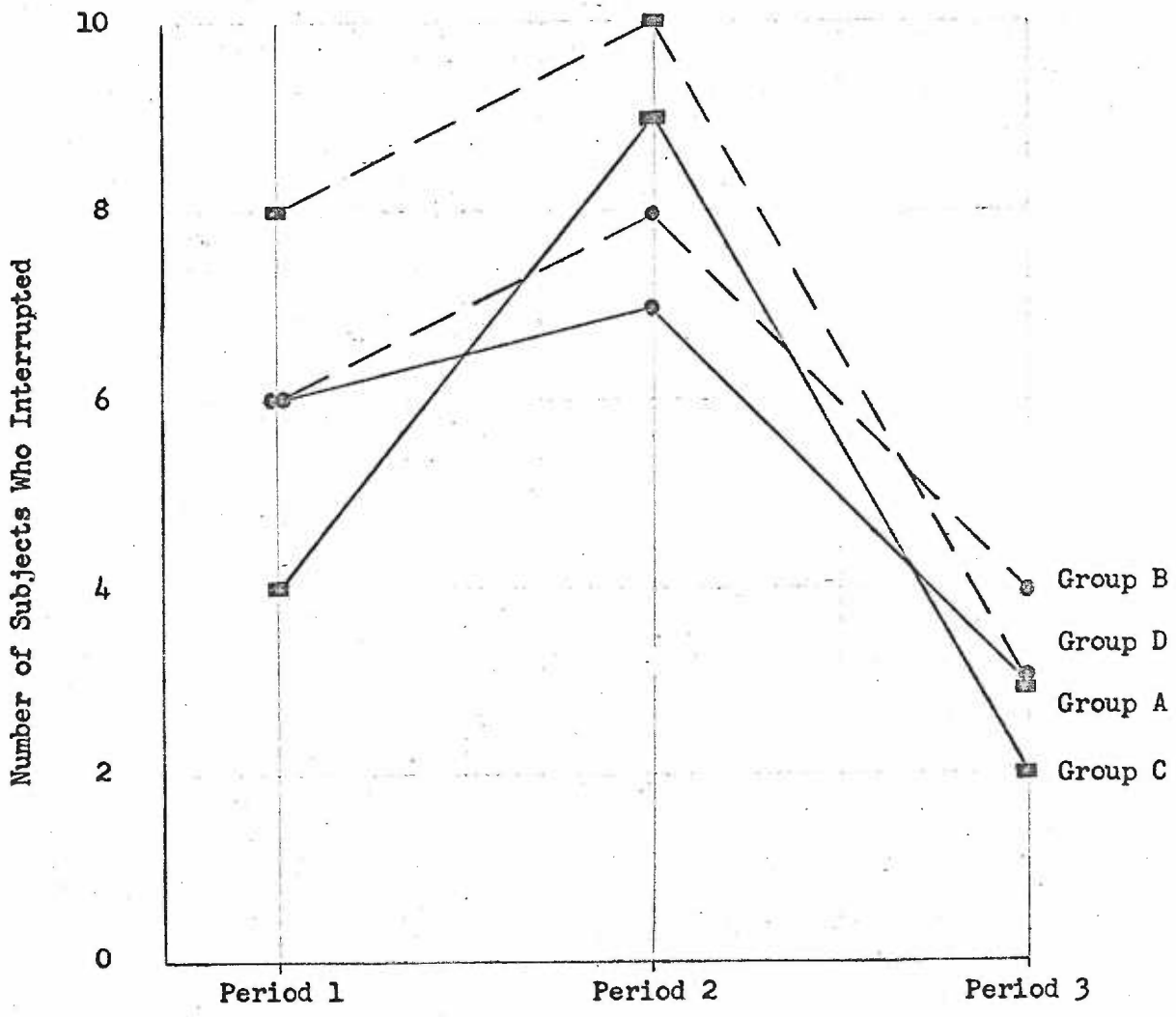
[4]Chi-square one sample test (Siegel, 1956, pp. 42-47).

Table 4. Number of Subjects Who Interrupted the Interviewer One or More Times, Tabulated for Each of Four Groups Across Three Individual Interview Periods

	Period 1	Period 2	Period 3	Chi-square Values
Group A	6	7	3	1.62
Group B	6	8	4	1.33
Group C	4	9	2	5.20
Group D	8	10	3	3.71
All Groups Combined	24	34	12	10.42**

** p of .01

Figure 3. The Number of Subjects Who Interrupted the Interviewer Plotted Across Three Interview Periods for Two Deception Groups (A and C) and Two Neutral Groups (B and D), 20 Subjects per Group.


10
8
6
4
2
0
Number of Subjects Who Interrupted
Period 1
Period 2
Period 3
Group B
Group D
Group A
Group C

were not significant across periods. It was found, however, that the chi-square value for all groups combined (N of 80) was significant (p of .01). This result is not surprising since all four groups showed an identical pattern with regard to changed in frequency across periods of those who interrupted.

In summary, then, the results regarding interruption behavior were similar to the results found regarding reaction time latency and duration of utterance. Experimental and control groups were not differentiated by the number of individuals who interrupted the interviewer. Interestingly, an identical pattern of change was noted in each group: the number of subjects who interrupted was highest in the middle (education) period of the interview and lowest in the last period of the interview.

Tests and Questionnaires

In addition to measures of the subject's speech behavior during the interviews, written responses on tests and questionnaires were also collected for each subject. Each subject was given (1) two personality tests, the Minnesota Multiphasic Personality Inventory (14 scales) and the Maudsley Personality Inventory (3 scales), (2) a short test of intelligence, the Shipley-Hartford Retreat Scale (one total scale and two subscales), and (3) three questionnaires, a background questionnaire and two short questionnaires about the interview. It will also be remembered that the interviewer and observer wrote down their post-interview guesses as to whether or not the interviewee had been given the motivational set to deceive.

It was decided for exploratory purposes that a large correlation

Table 5. Variables Used in Correlation Matrix

1. Subject's age
2. Subject's years of education
3. Subject's marital status
4. Subject's Maudsley N score
5. Subject's Maudsley E score
6. Subject's Maudsley ? score
7. Subject's Shipley-Hartford vocabulary score
8. Subject's Shipley-Hartford abstract score
9. Subject's Shipley-Hartford total score
10. Subject's WAIS equivalent
11. Subject's MMPI L Score
12. Subject's MMPI F score
13. Subject's MMPI K score
14. Subject's MMPI Hs score
15. Subject's MMPI D score
16. Subject's MMPI Hy score
17. Subject's MMPI Pd score
18. Subject's MMPI Mf score
19. Subject's MMPI Pa score
20. Subject's MMPI Pt score
21. Subject's MMPI Sc score
22. Subject's MMPI Ma score
23. Subject's MMPI Si score
24. Subject's MMPI TAS score
25. Interviewer's duration of utterance, period 1
26. Interviewer's duration of utterance, period 2
27. Interviewer's duration of utterance, period 3
28. Subject's duration of utterance, period 1
29. Subject's duration of utterance, period 2
30. Subject's duration of utterance, period 3
31. Interviewer's mean reaction time, period 1
32. Interviewer's mean reaction time, period 2
33. Interviewer's mean reaction time, period 3
34. Subject's reaction time, period 1
35. Subject's reaction time, period 2
36. Subject's reaction time, period 3
37. Subject's number of interruptions, period 1
38. Subject's number of interruptions, period 2
39. Subject's number of interruptions, period 3
40. Interviewer's guess (Lie=1, Truth=2)
41. Observer's guess (Lie=1, Truth=2)
42. Subject's estimate "How hard?"
43. Subject's estimate "How well?"

matrix should be constructed in order to test the possible relationships between speech measures, personality test scores, and questionnaire responses. Table 5 contains a list of the variables used in constructing the correlation matrix.

Each of the 43 variables listed above was correlated with each of the other 42 variables. This produced 860 intercorrelations. Because there were 4 groups and correlations for each group were computed separately, the total number of intercorrelations computed was 3440. Out of this many correlations approximately 172 would be expected by chance to be significant at the .05 level of probability.

If measures taken on all 80 subjects had been correlated with all other measures, it would have been impossible to determine which significant correlations had occurred by chance and which ones represented valid relationships. Because, however, the correlations between measures were computed for each of the four groups separately, it was possible to crossvalidate any significant relationships found.

Of primary interst in this study was the question of which, if any, test and questionnaire measures correlated with temporal speech measures, the dependent variables in this study. Briefly stated, the results of the correlations were negative; test and questionnaire variables did not correlate with variables such as the subject's reaction times, durations of utterance, or interruption frequency. In no case were significant correlations between these variables crossvalidated across all four or even three groups. In only one case was there a crossvalidated correlation found between subjects' behavior and another type of variable. In this case it was found that the interviewer's guess

that the subject was telling the truth was negatively correlated with the number of interruptions by the subject during the second (college education) period of the interview. Even though this negative correlation was found significant for two groups (the prior neutral instruction group B and the interspersed lie instruction group C), small positive correlations were found for the other two groups. It thus appears that even this "crossvalidated" correlation probably occurred by chance.

The results of correlating an interviewee speech variable in one period with its counterpart in another period led to a clear-cut validation of the results of previous studies showing high inter-period reliability for both reaction time latency and duration of utterance. The correlations between periods for each group on these variables are presented in Table 6. The magnitudes of these reliability coefficients are all the more meaningful when the reader is told that period 1 lasted on the average only about 9 minutes, period 2 about 11 minutes and period 3 about 12 minutes.

The frequency of a subject's interruptions was not, however, found to be particularly stable across interview periods. Inspection of Table 6, bottom, shows that only in Group C was there a period-to-period consistency in the frequency with which subjects interrupted. The low positive and the negative correlations that were found in the other groups do not match the results from previous research which have indicated that interruption rate tends to be stable (Wiens, Saslow, and Matarazzo, 1966, as reviewed in the introductory section).

The overall failure to find a stability across periods in the subject's

Table 6. Correlations Between Reaction Time Latencies, Between Durations of Utterance, and Between Interruption Frequencies Across Periods For Two Deception Groups (A and C) and Two Neutral Groups (B and D)

Reaction Time Latencies

	Period 1 vs Period 2	Period 1 vs Period 3	Period 2 vs Period 3
Group A	.76***	.84***	.83***
Group B	.37	.22	.80***
Group C	.80***	.52*	.59**
Group D	.79***	.82***	.78***

Durations of Utterance

	Period 1 vs Period 2	Period 1 vs Period 3	Period 2 vs Period 3
Group A	.81***	.70***	.86***
Group B	.88***	.84***	.86***
Group C	.76***	.67***	.78***
Group D	.92***	.88***	.90***

Interruptions

	Period 1 vs Period 2	Period 1 vs Period 3	Period 2 vs Period 3
Group A	-.11	-.08	-.05
Group B	.36	.25	-.05
Group C	.53*	.20	.72***
Group D	.08	-.21	.52*

*p of .05

**p of .01

***p of .001

interruption frequency may be in part due to the restricted range in interruption frequency; 36 out of the 80 subjects in the present study never interrupted the interviewer. The 99 interviewees in the study by Wiens, Saslow and Matarazzo, on the other hand, all interrupted at least once and one interrupted in 56 percent of his utterances. The differences in interruption rate between this study and the one by Wiens et al. might be accounted for by differences in interviewee population and/or the interview situation. Wiens et al. interviewed psychiatric patients in "typical initial psychiatric interview". These interviews were undoubtedly much more "free-flowing" than the ones used in this study; no attempt was made in the previous study to standardize the content of the interviews. The 45 interview questions which determined the content in the present study were, on the other hand, specified in detail.

DISCUSSION

Effect of Experimental Procedures

The results of this study do not support the hypothesis that the motivational state associated with instructions to deceive will affect temporal aspects of interviewees' speech. Though changes across topic periods were found for interviewees who had been given the instructional set to lie, the same changes were found for interviewees who were given neutral instructions[5]. When means for the four groups were compared for each period, no significant differences were found in any of the three periods. That is, group means were not different during either (1) the second topic period when the topic made lying necessary for those in lie groups, or (2) the first and third periods when the topic areas did not require deception from groups asked to deceive.

Furthermore, lack of differences between groups during any period leads to the following conclusions:

(1) Because there were no differences in period 1 scores between Groups B and D, it can be concluded that prior, neutral, time-filler instructions (Groub B) acted much as no prior instructions (Group D).

(2) Because there were no differences in period 2 scores between Groups A and C, it can be concluded that extra time to prepare to lie (Group A) did not lead to behavior

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[5]That these changes were real rather than statistical artifacts can be readily determined by inspection of the temporal distributions for mean reaction time latencies and for mean durations of utterance which are shown in Appendices E and F, respectively.

different from the behavior of subjects who were given instructions to lie just prior to their being questioned in the lie topic.

(3) Because there were no differences found in period 2 between Groups A and C and between Groups B and D, it can be concluded that interrupting an interview to give instructions does not lead to changes in speech behavior.

(4) Because there were no differences found in period 1 between Groups C and D (both of which had no prior instructions), it can be concluded that for these two groups (and, therefore, presumably for all groups) the procedures used to assign subjects to groups (random assignment except for keeping ages and college status comparable) led to the formation of groups comparable in their speech characteristics.

The above findings which are related to the adequacies of controls would have been more crucial if changes and differences had been found to result from lie instructions. Nevertheless, despite the failure of the speech indices to mirror the motivational set, the results do have some interpretive significance in explaining the failure of the instructional set to produce significant effects on speech behavior. For example, it does not appear that this failure was due to either (1) neutral instructions not really being neutral, (2) subjects getting instructions to deceive either too early or too late before they were required to lie, or (3) differences being obscured by failure to randomly assign subjects to groups.

Furthermore, the lack of significant effects due to instructions cannot be explained by a failure of the lie instruction procedures to motivate the subjects to lie. This is clearly shown by the fact that subjects in the lie groups did claim during their interviews to have an extra year of college. (Subjects indicated their actual college status on a background questionnaire as the first step in their participation in this study.) Furthermore, subjects in the lie groups were able to state the instructions they had received. (On a post-experimental questionnaire subjects were asked to write down what instructions they had received. Only one subject in one of the lie groups failed to write down some variation on "lie about education".)

It might be argued that though instructions to deceive were effective in motivating subjects to deceive, other aspects of deception in more realistic settings were missing. That is, the reasons for lying and the consequences of lying this experimental study were much different than the reasons and consequences accompanying "true" deception. In more realistic settings deception may involve gain if the lie goes undetected but loss and/or punishment if it is detected. In this study, however, no rewards or punishment were made contingent upon successful deception.

There is one other usual aspect of deception which was probably missing in this experimental study of deception -- guilt. Subjects who received instructions to lie were explicitly absolved from any wrongdoing by the instructions which read in part: "We do not feel that an experimental investigation involving deception is unethical." Thus, subjects were explicitly told that they were doing nothing wrong and that (implicitly) it was "for the sake of science".

The notion that subjects did not feel guilt about lying is supported by the fact that no subject refused to lie at the time instructions were given. Furthermore, no subject later indicated in any way that he had felt uncomfortable about lying. Rather, three subjects in the two lie groups (N=40) spontaneously wrote comments on their post-experimental questionnaires indicating that they had found the interview either interesting or enjoyable.

Because the conditions in this experiment on instructed deception were so different from conditions of more realistic deception, it can not be categorically concluded that the motivation to deceive has no effect on temporal measures of speech. These variables may be affected in situations where deception involves greater personal consequences or guilt for the deceiver. It does appear, however, that instructed motivation to deceive with social sanction does not have significant effects on durations of utterance, reaction times, or interruption behavior.

Changes Across Topic Periods

Though instructions to deceive were not found to cause differences in speech behavior, there were significant differences across the three periods found in all groups for reaction time latency, duration of utterance, and number of subjects who interrupted. These results are somewhat surprising (if not initially disconcerting), since the interviewing procedure was specifically designed and carried out so as to minimize differences across periods caused by factors other than the instructions given. For example, the interviewer attempted to standardize his speech behavior during the interview by asking

questions in five second utterances, by asking questions within one second following the end of the subject's utterance, and by not interrupting. Had the interviewer failed to follow this format, the changes in the subjects' behavior could possibly be explained by the effect of changes in the interviewer's behavior. Inspection of Table 7, however, will show that the interviewer did indeed keep to the standard format.

Looking at the interviewer's reaction time latency, it can be seen that he did keep his mean reaction times well under one second in every period for each group. Though the interviewer did respond with small, non-statistically significant differences in mean latencies across periods[6], in no instance did he speak with his shortest mean latency during period 2. It is, therefore, extremely doubtful that changes in the interviewer's reaction times could have caused the uniformly shorter mean latencies found for subjects during period 2; all previous research has shown that interviewees change their reaction times in direct concordance with the interviewer when he changes his reaction time latencies (Matarazzo and Wiens, 1967; Matarazzo, Wiens, Matarazzo and Saslow, 1968).

Inspection of Table 7 will also show that the interviewer was able to keep his mean durations of utterance near five seconds in length across periods of the interview. Though the interviewer and interviewees both tended to speak with their shortest mean durations of utterance during period 1, in no group was there a concordance across periods between the duration of utterance

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[6] F-values, based on the one-way analysis of variance for repeated measures, were computed to test for differences in the interviewer's reaction times and durations of utterance across topic periods in each group. As shown in Table 7, none of the period-to-period changes in the interviewer's speech measures reached statistical significance.

Table 7. Mean Reaction Time Latency and Duration of Utterance for the Interviewer for Three Periods in Two Deception Groups (A and C) and Two Neutral Groups (B and D)

	Period 1	Period 2	Period 3	p
Mean Reaction Time Latency in Seconds				
Group A	.36	.39	.46	
Group B	.43	.43	.55	
Group C	.34	.44	.52	
Group D	.38	.55	.62	
Mean Duration of Utterance in Seconds				
Group A	5.4	5.5	5.5	
Group B	5.4	5.5	5.6	
Group C	5.4	5.4	5.5	
Group D	5.6	6.0	5.9	

for the interviewer and the duration of utterance for the subjects. That is, the small nonsignificant changes which naturally occurred in the interviewer's durations of utterance were not related to changes in the interviewee's durations of utterance. When a correlation was computed between percentage of change for the interviewer's mean durations of utterance between period 1 and period 2 and the percentage of change for the 80 interviewees' mean durations between period 1 and period 2, the Pearson r equaled -.09 (p not significant). A similarly low correlation (r= -.08, p not significant) was found for the percentage of change in mean durations of utterance for the interviewer and interviewees between periods 2 and 3. Thus, it appears that the significant changes in durations of interviewee utterances that were found across topic periods were due to something other than a failure of the interviewer to follow his standard interview format.

With regard to interviewees' interruption behavior, there is no reason to believe that the significant changes in interruption incidence that were found across topic periods (Table 4) were due to the interviewer's behavior. In only five out of several thousand utterances did the interviewer begin speaking before an interviewee had finished his utterance. Thus, the interviewer interrupted only a small fraction of 1% of the 80 interviewees' utterances. No conceivable effect could result from these few instances where the interviewer failed to avoid interrupting (especially since none occurred during the second topic period).

Given that the interviewer's noncontent speech behavior did not cause significant changes in the noncontent speech behavior of interviewees, it

must be asked what did? There are two possibilities. One is that the interviewees reacted differently across periods as a function of the length of the interview. That is, subjects' shorter reaction times during the second interview period might, for example, be explained by some effect due to their having spent nine minutes on the average answering 15 questions during the first interview period. Another possibility is that interviewees reacted differently across topic periods because of the content of the questions that were asked.

The notion that effects from the length of the interview were responsible for significant changes in reaction time latencies is not easily maintained. All groups had their shortest mean latencies during the second period of the interview. It might be maintained that interviewees reacted more quickly in period 2 than in period 1 because they saw the interviewer as "warmer" during this period (Allen et al., 1965, cited above). The longer reaction times that were found during the subsequent third period, however, do not support this argument.

The notion that effects due to the length of the interview were responsible for changes in reaction times is made even less tenable by the fact that the degree of change in an interviewee's reaction times between period 1 and period 2 was apparently not related to the duration of the first interview period. This was concluded on the basis of a correlation computed between all 80 interviewees' mean durations of utterance[7] in period 1, and their percent

[7] A subject's mean duration of utterance in a period is a good index of the period length. Because of the standard interview questions, the length of the subject's responses accounts for almost all the variance in length of interview periods.

of change in mean reaction time latency between period 1 and 2. The value of the Pearson r equaled -.06, p not significant. Thus, it does not appear that the shorter mean reaction time latencies which were consistently found across groups were due to effects of interview length.

The alternative hypothesis is that reaction time changes were due to different question characteristics across periods. It had been planned a priori that such effects would be avoided by asking questions across periods which did not differ in their average specificity, open-endedness, difficulty, or the degree to which they were anxiety-provoking. After again looking (post hoc) at these questions (Appendix D), it was decided that the questions did not manifestly vary in these dimensions across topic periods. It thus seemed that if the questions were responsible for changes in reaction times, it was not because of their form but because of the content topic itself.

The notion that content alone could affect reaction times is being proposed in a recent, as yet unpublished, study by Matarazzo, Wiens, Jackson, and Manaugh. In this study two groups of police applicants (N=60 and N=30, respectively) were interviewed on the following topics which were counterbalanced for order: family, education, and occupation. It was found in the first group that applicants had their shortest mean reaction time latencies during the occupation topic in 33 out of the 60 cases (p of .001). Even more striking were the results for the second group of 30 applicants. It was found that 22 out of 30 had their shortest mean reaction times during the occupation topic (p of .001). Matarazzo et al. hypothesized that these results were due to the effect of topic "saliency". That is, that the interview topic of "occupation" was the interview

topic which carried the greatest personal import for these job applicants. It was the topic most immediately related to their application for employment. Similar reasoning can be used to explain why the college students in this study (in both the control as well as experimental groups) reacted most quickly to questions about their college education. Looking back at the questions again, it can be seen that the questions in the college education topic quite probably had the greatest immediate relevancy for these college students. Thus, it can by hypothesized that just as the occupation topic was most salient (as a motivational variable) for the police applicants, college education was most salient for the 80 subjects in the present study.

With respect to durations of utterance, there are, again, two possible hypotheses to explain the significant increases in durations that were found between period 1 and period 2. Effects of interview length appear in this case to be a more tenable hypothesis than they were in the case of reaction time latencies. The maintenance of the increased level of mean durations of utterance through period 3 suggests that a warm-up effect may have been operating. The alternative hypothesis of a topic effect (which does not exclude some warm-up effect) is also tenable. As a matter of fact, past research lends support to both hypotheses. That is, past research would support the notion that the longer mean durations of utterance that were found in periods 2 and 3 were due to both a warm-up and a topic effect.

Pertinent to the possibility of a warm-up effect, is the study by Matarazzo, Saslow, and Weitman (1963). In this study 20 police applicants were interviewed for 45 minutes, 15 minutes each on the topics of family, education,

and occupation. Because the topics were counterbalanced for order, changes which occurred across the three 15 minute interview segments could not have been due to topic effects. It was found that the average of the 20 applicants mean durations of utterance in the first segment was 33.6 seconds, compared with 42.7 seconds and 40.8 seconds in the second and third 15 minute segments, respectively. Though these means were not significantly different, some warm-up effect was suggested; differences as large as those found would have occurred by chance with a probability of less than ten percent.

The recent study by Matarazzo, Wiens, Jackson and Manaugh, as cited previously, is pertinent to a discussion of both warm-up and topic effects. In this study one group of police applicants (N=30) showed a significant period effect. The means for this group's durations of utterance increased across the three 15 minute interview periods as follows: 35.2 seconds, 38.2 seconds, and 46.9 seconds (p of .05). This significant increase was not, however, crossvalidated in the larger group of 60 applicants.

The results with regard to effects of topic were clearer. In both groups of applicants there was a significant tendency to speak in longer utterances when the topic was occupation (counterbalanced for period). In the group of 60 applicants 32 spoke with their longest mean durations during the occupation topic (p of .01). In the group of 30 applicants 17 spoke with their longest durations about occupation (p of .02). Because the topics in this study were counterbalanced for order, the differences that were found were almost certainly due to the differences in content topic. Matarazzo et al. hypothesized that these differences were due to the greater saliency of the occupation topic. It is, of course, not difficult

to imagine that longer utterances should be associated with topics which are more interesting, relevant, and/or important to the speaker. Stated another way, it is reasonable that the temporal length of an interviewee's utterances when discussing a topic should reflect something about his (endogenous) emotional or attitudinal response to the topic.

Following the argument advanced by Matarazzo et al., it might be hypothesized that college students in the present study increased their utterance durations between period 1 and period 2 because the period 2 topic (college education) was more salient than the period 1 topic (family and early background). These results, then, are consistent with the results from the study by Matarazzo et al. Just as Matarazzo et al. found shorter reaction times and longer latencies to be associated with the most salient topic (occupation), so were shorter reaction times and longer utterances associated with the (presumably) most salient topic in this study (college education).

It must be remembered, however, that the longer durations that were found in period 2 (college education) were maintained through period 3 (occupation). This result would appear at first glance to be inconsistent with the hypothesis concerning the effects of topic saliency; the college students did not shorten their durations of utterance during period 3, when they spoke about the presumably less salient topic of occupation. This result can perhaps be explained, however, by a warm-up effect even though the results of previous research (reviewed above) have not yet conclusively shown the existence of such an effect. There is, however, enough evidence on this point to support a tentative hypothesis that the maintenance of longer durations of utterance through

period 3 was due to a warm-up effect.

Molde and Wiens (1967) pointed out that there is a sort of "mechanical" relationship between reaction time latencies and interruptions. They were referring to the fact that interruptions can be considered very fast responses, responses that come even before the conversational partner has finished speaking. The reaction time latency recorded for interrupting responses is 0.0 seconds. Thus, it is obvious that interruption frequency and reaction times are not wholly independent measures; many interruptions would tend to be associated with shorter mean reaction times. This association was demonstrated in the Molde and Wiens study by the negative correlation found between mean length of reaction time latency and percentage of interruption. It was found that the reaction times of 20 psychiatric nurses were negatively correlated with the percentage of their utterances which were interruptions during a 30 minute interview (Pearson r= -.60, p of .01). Almost identical results were found then for a group of 20 surgical nurses (Pearson r= -.59, p of .01).

The relationship between reaction time and interruptions was much less pronounced in the present study than in the study by Wiens and Molde. Pearson r correlations between the subject's mean reaction time latency and his frequency of interruptions were computed for each of the four groups in each of the three interview periods. Inspection of these correlations (Table 8) indicates that in this study the frequency with which a subject interrupted and the quickness of his reaction times were relatively independent.

Only in one period for one group (Group A) was there a significant

Table 8. Correlations Between Interruption Frequency and Reaction Time Latency, Computed for Two Deception Groups (A and C) and Two Neutral Groups (B and D) Across Three Interview Periods

	Period 1	Period 2	Period 3
Group A	-.01	-.47*	-.20
Group B	.16	-.26	.05
Group C	.01	.24	.08
Group D	-.07	-.40	-.35

* p of .05

negative correlation between interruption frequency and length of reaction times. The general lack of any significant relationship suggests that the changes that were found to occur in interruption behavior were not simply reflections of changes in quickness of responding[8]. Indeed, the reaction times of the college students during these interviews were never exceptionally quick, even at their quickest. Compare, for example, the mean reaction times of the 20 college students in Group B (prior neutral instructions) with the reaction times of 60 police applicants from the recent study by Matarazzo, Wiens, Jackson and Manaugh. The college students averaged 2.84, 1.85 and 2.49 seconds across three topic periods, while the police applicants averaged only .95, .88, and .94 seconds across three interview periods, counterbalanced for topic.

Consistent changes were found across periods in the number of subjects who interrupted. Given that these changes were not artifacts of changes in reaction times, it must be asked what caused these changes. The fact that subjects were most likely to interrupt during the middle interview period (college education) makes a warm-up type of explanation doubtful. Rather, more likely (and consistent with the previous discussion) would be an explanation based upon effects of topic content. Specifically, it might be hypothesized that speakers are likely to interrupt when discussing topics which are salient for them. This notion draws some limited support from the previously

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[8] It should be mentioned that the converse of this statement is true; the relatively small number of interruptions recorded could not (and did not) account for the changes which were found in reaction time latencies. The 35 subjects who never interrupted showed the same pattern of change across the three periods as the 45 who did interrupt (means of 2.92, 2.30, 3.42 seconds and 2.40, 1.84, and 2.53 seconds, respectively).

cited recent study by Matarazzo, Wiens, Jackson, and Manaugh. In that study there was no significant change in interruption behavior as police applicants discussed their family, education, and occupation. Mean percentages of interruptions for 60 applicants were 10.2 (family), 8.1 (education), and 11.1 (occupation). Though not significant, the changes across topics are consistent with the saliency hypothesis. Namely, police applicants interrupted most often when discussing the topic (occupation) that had the greatest presumed saliency for them. A second group of police applicants (N=30) also interrupted most often when discussing occupation. When the occupation topic was discussed, 11.4 percent of their utterances were interruptions on the average versus 9.0 percent and 5.3 percent during the family and education topics, respectively. These results match the results from the four groups in the present study; in each group subjects were most likely to interrupt during the topic period that was presumably most salient for them (college education). The consistency of these data allow at least the tentative hypothesis that the changes that were found in interruption behavior were due to changes in topic saliency.

SUMMARY

Two groups of male college students received an instruction-induced motivational set to deceive an interviewer about their college status. One group received instructions just before the interview, the other after a neutral (baseline) period in the interview. Two control groups received neutral instructions at the same respective times. Measures of interviewee reaction times, durations of utterance, and interruption behavior were recorded during three content topic periods of a standardized interview (family, college education, and occupation).

It was hypothesized that the set to deceive would result in longer reaction time latencies, especially in the second period (college education) when the instructions would be most relevant. No differences were found to result from either time at which instructions were given or the form of the instructions (lie versus neutral). Nevertheless, similar changes in the dependent (speech) variables were unexpectedly found across periods for all four groups, those getting neutral instructions as well as those getting lie instructions. Interviewees in three groups reacted significantly more quickly to standard questions about their college education than to standard questions about their family background and/or to standard questions about occupational background. Changes in reaction time latencies across topic periods were not significant for the fourth group, but they followed the same pattern as changes in the other three groups.

All groups showed a significant increase in durations of utterance between the first topic period (family) and the second period (college education). This higher level of utterance duration was then maintained in the third topic

period (occupation).

Though almost half of the subjects never interrupted the interviewer, those who did interrupt were more likely to interrupt during the second topic period (college education) than during the other two topic periods.

The significant (but unexpected) topic (content) effects which were found were discussed with regard to two explanatory hypotheses – effects due to the topic content of the interview periods and effects due to the length of the interview (i.e., warm-up). It was hypothesized that the changes found across interview periods were caused by differences in the "saliency" of the topics discussed. Specifically, it was hypothesized that in period 2 the longer durations of utterance, shorter reaction time latencies, and larger number of subjects who interrupted were all due to the fact that college education was the topic with the greatest personal import and immediate relevancy for the interviewees. Other recent research from this laboratory strongly supports the serendipitous finding of the present study; namely, that some content topics are more salient than are other content topics.

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APPENDICES

Appendix A

Instructions for Lie Groups (A and C)

Dear Subject:

In our program of research we are attempting to identify some characteristics of interviews when people are under different motivational states. One area of interest to us is concerned with the motivational state operating when one person attempts to deceive another person. Mr. Manaugh does not know what instructions we are asking you to follow in this interview; that is, he doesn't know whether you are telling the truth at all times (a member of the control group) or are trying to deceive him in one area only (namely education). In fact, through random selection you are in the Experimental Group; namely, during the interview we want you to tell the truth in all areas but one. When he asks you anything about education we want you deliberately to lie, but skillfully so he does not know you are lying. The lie is simple: just tell him you are one year further in school than you are.

Can you deceive him so that he will believe you have had one more year of schooling than you actually have had?

During the interview he will be asking some questions about education. If you are a junior please imagine that you are a senior and answer those questions so that Mr. Manaugh will think that you are a senior. If you are a sophomore say that you are a junior, and answer all his questions accordingly. And if you are a freshman, make him believe you are a sophomore.

In our opinion, this study is a good way to investigate the emotional

state associated with lying. We do not feel that an experimental investigation involving deception is unethical. If you do not have any particular objection to misleading the interviewer, we would appreciate your attempting to make him really believe that you have had an extra year of school. Even if you feel that you have "given yourself away," please continue your attempt to deceive until the interview is over. You are NOT to tell him which group you are in; or otherwise to give him any clues.

Thank you very much for volunteering to help us in our research.

Appendix B

Instructions for Control Groups (B and D)

Dear Subject:

In our program of research we are attempting to identify some characteristics of interviews when people are under different motivational states. One area of concern is how different people react to the same questions (about education and career, for example) that would be asked in many interview situations. In order to compare people under different motivational states with normals, we need to have a comparison group of normal people. This is where we need your help. During the interview we would appreciate your answering questions just as you would in any interview situation -- for example, when applying for a job.

We have written out these instructions so that all our subjects will get exactly the same instructions. Mr. Manaugh will be happy to discuss our research further at the end of the interview. In order to have everything as standard as possible, we would rather you would not ask any questions until the interview is finished. Thank you very much for volunteering to help us in our research.

Appendix C

The questionnaire shown below was given to each interviewee immediately after his interview. In addition, a second questionnaire was handed the interviewee after he had completed the own shown. The second questionnaire was on a half sheet of paper and included only two items: "The purpose of this experimental interview was:" and "My evidence is:".

QUESTIONNAIRE

Name _____

What instructions did you receive as to how you were to answer questions in the interview? _____

_____

How hard did you try to carry out those instructions? Circle one of the following:

Not at all A little Moderately Fairly hard Very hard

Other comments: _____

_____

Appendix D: 45 Standard Interview Questions

Family and Early Background

1. Where were you born and what are some of your most vivid memories from the time before you were six years old?
2. How would you rank for enjoyableness between the ages of six and eleven: playing at school, with your family, or with neighborhood children?
3. What kinds of vacation trips did you go on with your family when you were a boy?
4. Which summer activities stick most in your mind from the period when you were between six and eleven?
5. Which of the friendships from your childhood have stuck most in your mind in the past years?
6. In what order, from most to least enjoyable, would you rank your years between six and eleven, twelve and fourteen, and fifteen and eighteen?
7. How would you, then, rank each of these three periods as to the closeness of the friendships you made?
8. What kinds of hobbies did you engage in as a teenager – say between fifteen and eighteen?
9. What events from your years between six and eleven will stick most in your mind in coming years?
10. What events from your years between fourteen and eighteen will stick most in your mind in coming years?

Appendix D, Continued

11. What weekend activities did you find that you enjoyed most when you were between fourteen and eighteen?
12. What persons, beisdes your parents, made the greatest impression on you during the years you were growing up?
13. How would you relate your childhood experiences to the idea that children should have specific responsibilities?
14. As you've become older, how have your ideas changes as to children's responsibilities to their parents?
15. How important do you feel it is to have brothers and sisters around when a person is growing up?

College Education

Based on each subjects answer to the first question, the interviewer tailored the questions to fit the subject's claimed college status. Thus, if the subject answered he was a college junior to question 1, when the interviewer got to question 3 he filled in the blank places shown below with "second" and "third" year in college, etc. Subjects who claimed just one year of college were asked about quarters rather than years.

1. What is your year in college and how have your ideas about college changed each year since you first entered?
2. How would you rank, from most to least enjoyable, each of your summer vacations from school since you were a _____?

3. What activities did you engage in during your summer vacation between your _____ and _____ years in college?

4. What activities did you engage in during your last summer vacation -- after your _____ year?

5. What new friendships did you make in each of the _____ years you have been in college?

6. In what order, from most to least enjoyable, would you rank each of your _____ years in college?

7. Now, how would you rank each of your college years as to how much you have learned?

8. What sorts of extracurricular activities have you been involved in during each of your _____ years in college ?

9. What events from your _____(past)_____ year will stick most in your mind in coming years?

10. What events from your _____(present)_____ year will stick most in your mind in coming years?

11. What courses did you take related to your major, or whatever your major will be during your _____ year?

12. What courses have you taken in the field of your major during this past year?

13. Which professors have made the greatest impression on you in each of the past _____ years?

14. What kinds of grades did you get during each of the years you have been in college?

15. Approximately how many hours of college credit do you have and what are

Appendix D, Continued

plans for completing your degree requirements?

Occupation

1. What kinds of jobs, part-time or otherwise, have you held during the past three or four years?
2. How would you rank, from most to least enjoyable: working under close supervision, some supervision, or no supervision.
3. What kinds of activitied did you enjoy most on the last job you held?
4. What other job activities have you found enjoyable in the other jobs you have had?
5. What new friendships did you make in the past few jobs you have held?
6. In what order, from most to least enjoyable, would you rank each of the past few jobs you have held?
7. Now, how would you rank each of your last few job experiences as far as how much you learned?
8. What experiences, on a job or otherwise, have most affected your ideas about a suitable career for yourself?
9. What things about your last (present) job will stick most in your mind in coming years?
10. How have your thoughts changed in recent years regarding the plans you have for a career?
11. What factors do you think are important for a person to consider before he chooses a career?

Appendix D, Continued

12. What persons that you have worked with have made the greatest impression on you?
13. What factors other than career will influence your decision as to where to locate your permanent home?
14. How would you rank your chances for success if you were to enter either business, teaching, or science?
15. What are your ideas regarding working with either a large or small group of people?

Appendix E

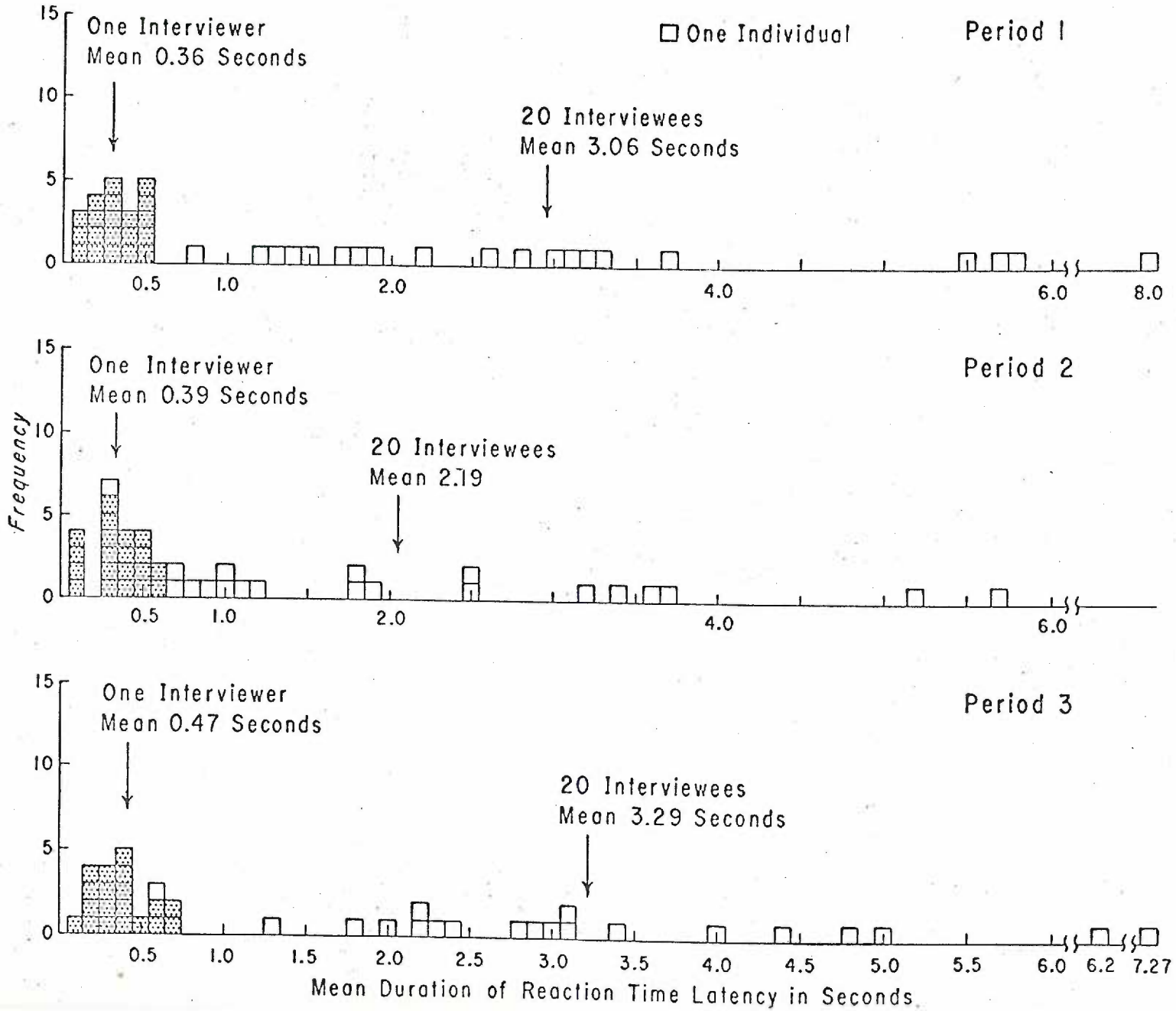
Frequency Distributions of Mean Reaction Time Latencies for Subjects in Each of Four Groups

Appendix E, Group A

Distribution of Mean Duration of Reaction Time Latency

During 3 Periods for 20 Individuals, and for One Interviewer

Lie Instructions: Just Before Interview

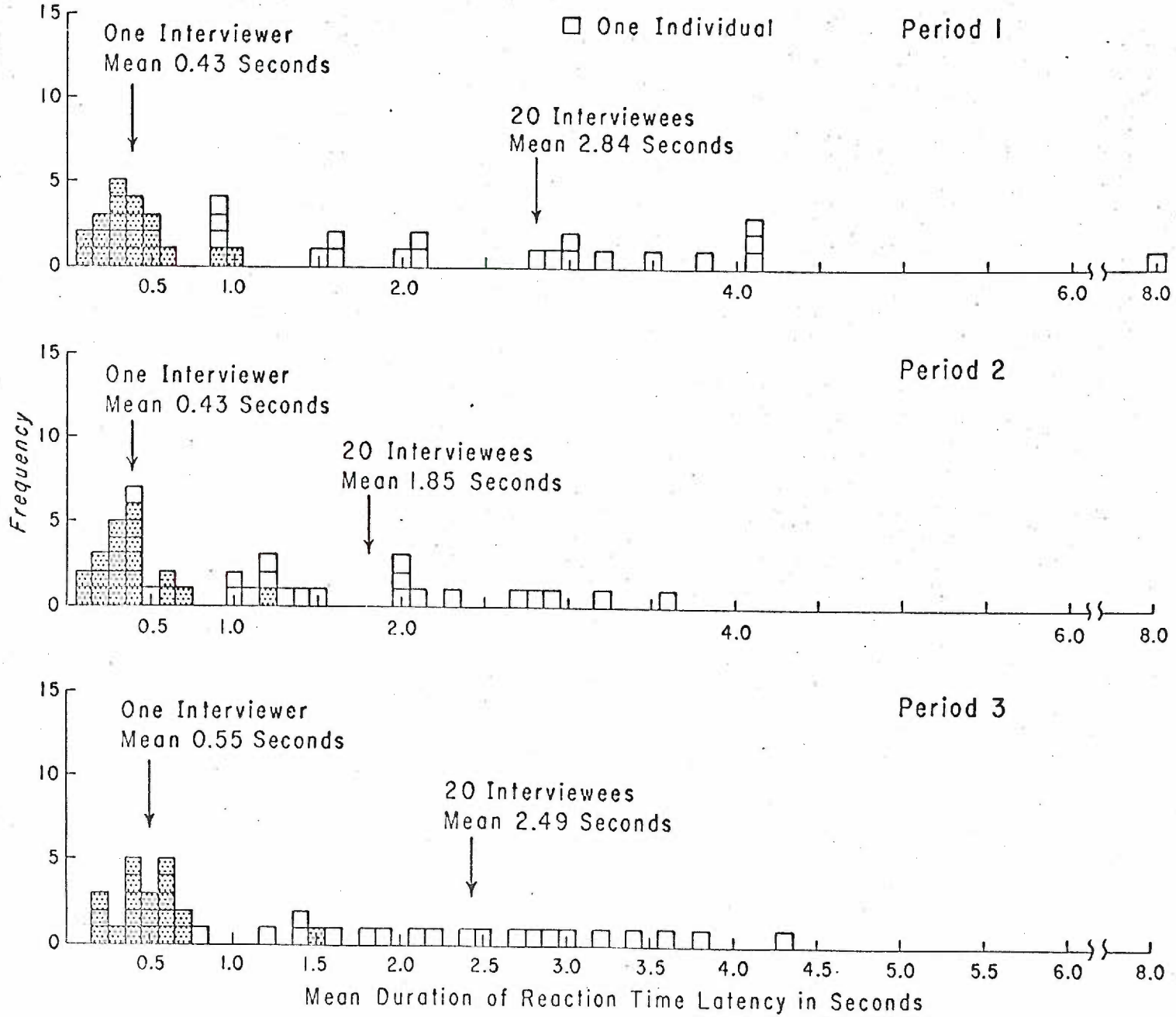

One Interviewer
Mean 0.36 Seconds
One Individual
Period 1
20 Interviewees
Mean 3.06 Seconds
One Interviewer
Mean 0.39 Seconds
Period 2
20 Interviewees
Mean 2.19
Frequency
One Interviewer
Mean 0.47 Seconds
Period 3
20 Interviewees
Mean 3.29 Seconds
Mean Duration of Reaction Time Latency in Seconds

Appendix E, Group B

Distribution of Mean Duration of Reaction Time

Latency During 3 Periods for 20 Individuals, and for One Interviewer

Neutral Instructions: Just Before Interview

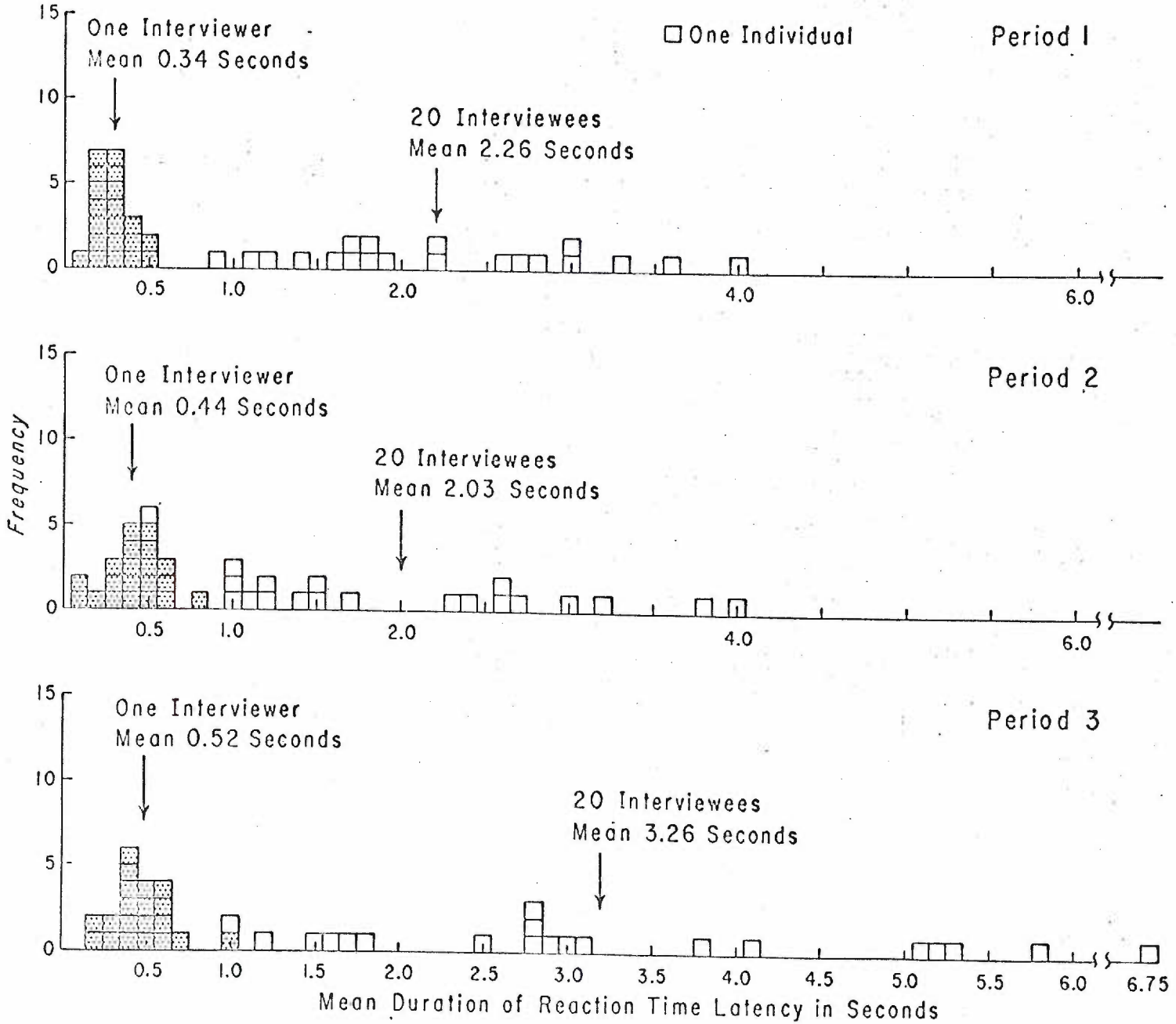

One Interviewer
Mean 0.43 Seconds
One Individual
Period 1
20 Interviewees
Mean 2.84 Seconds
One Interviewer
Mean 0.43 Seconds
Period 2
20 Interviewees
Mean 1.85 Seconds
Frequency
One Interviewer
Mean 0.55 Seconds
Period 3
20 Interviewees
Mean 2.49 Seconds
Mean Duration of Reaction Time Latency in Seconds

Appendix E, Group C

Distribution of Mean Duration of Reaction Time

Latencies During 3 Periods for 20 Individuals, and for One Interviewer

Lie Instructions: In Middle of Interview

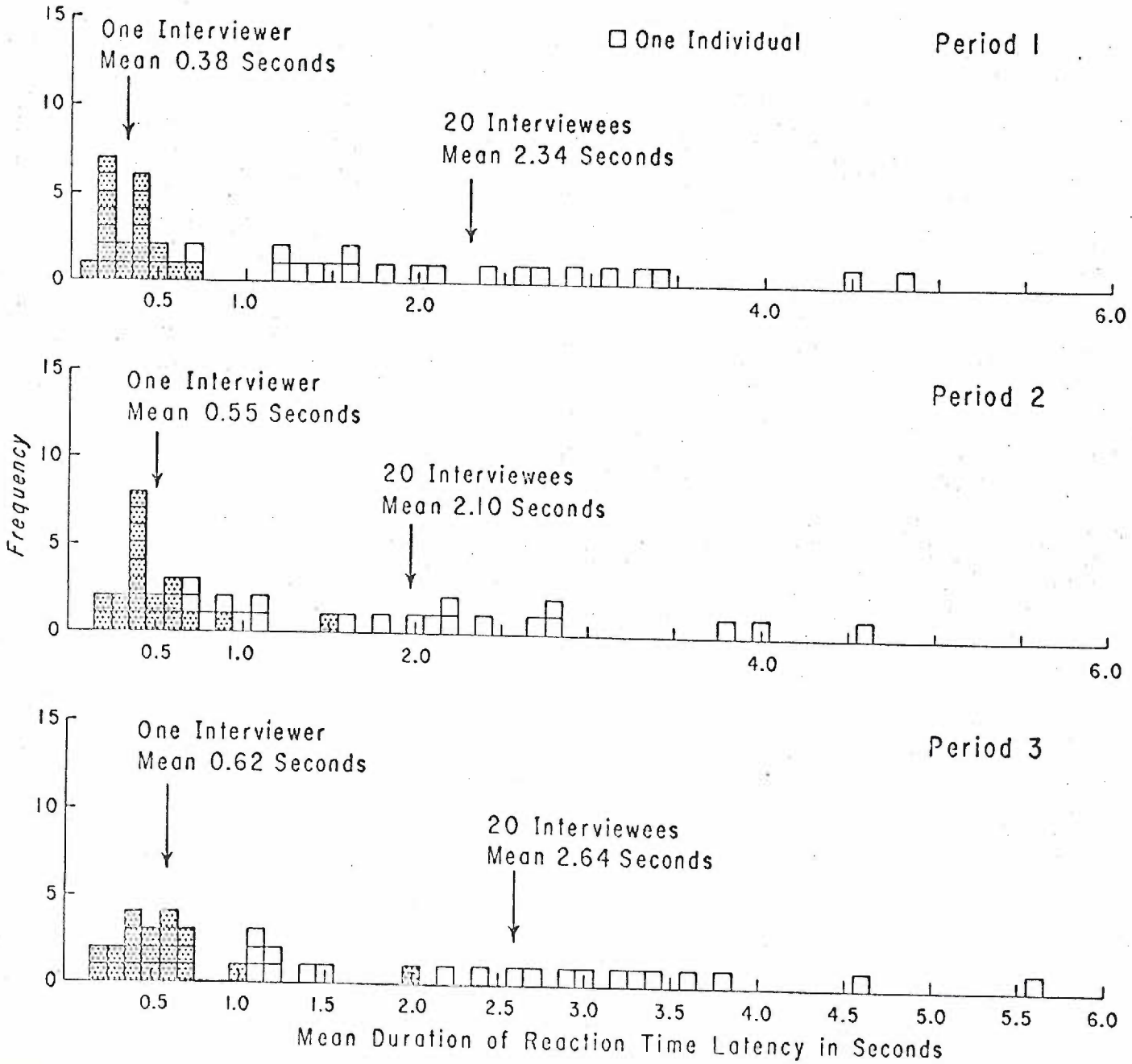

One Interviewer
Mean 0.34 Seconds
One Individual
Period 1
20 Interviewees
Mean 2.26 Seconds
One Interviewer
Mean 0.44 Seconds
Period 2
20 Interviewees
Mean 2.03 Seconds
Frequency
One Interviewer
Mean 0.52 Seconds
Period 3
20 Interviewees
Mean 3.26 Seconds
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.75
Mean Duration of Reaction Time Latency in Seconds

Appendix E, Group D

Distribution of Mean Duration of Reaction Time

Latency During 3 Periods for 20 Individuals, and for One Interviewer

Neutral Instructions: In Middle of Interview


One Interviewer
Mean 0.38 Seconds
One Individual
Period 1
20 Interviewees
Mean 2.34 Seconds
One Interviewer
Mean 0.55 Seconds
Period 2
20 Interviewees
Mean 2.10 Seconds
Frequency
One Interviewer
Mean 0.62 Seconds
Period 3
20 Interviewees
Mean 2.64 Seconds
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Mean Duration of Reaction Time Latency in Seconds

Appendix F

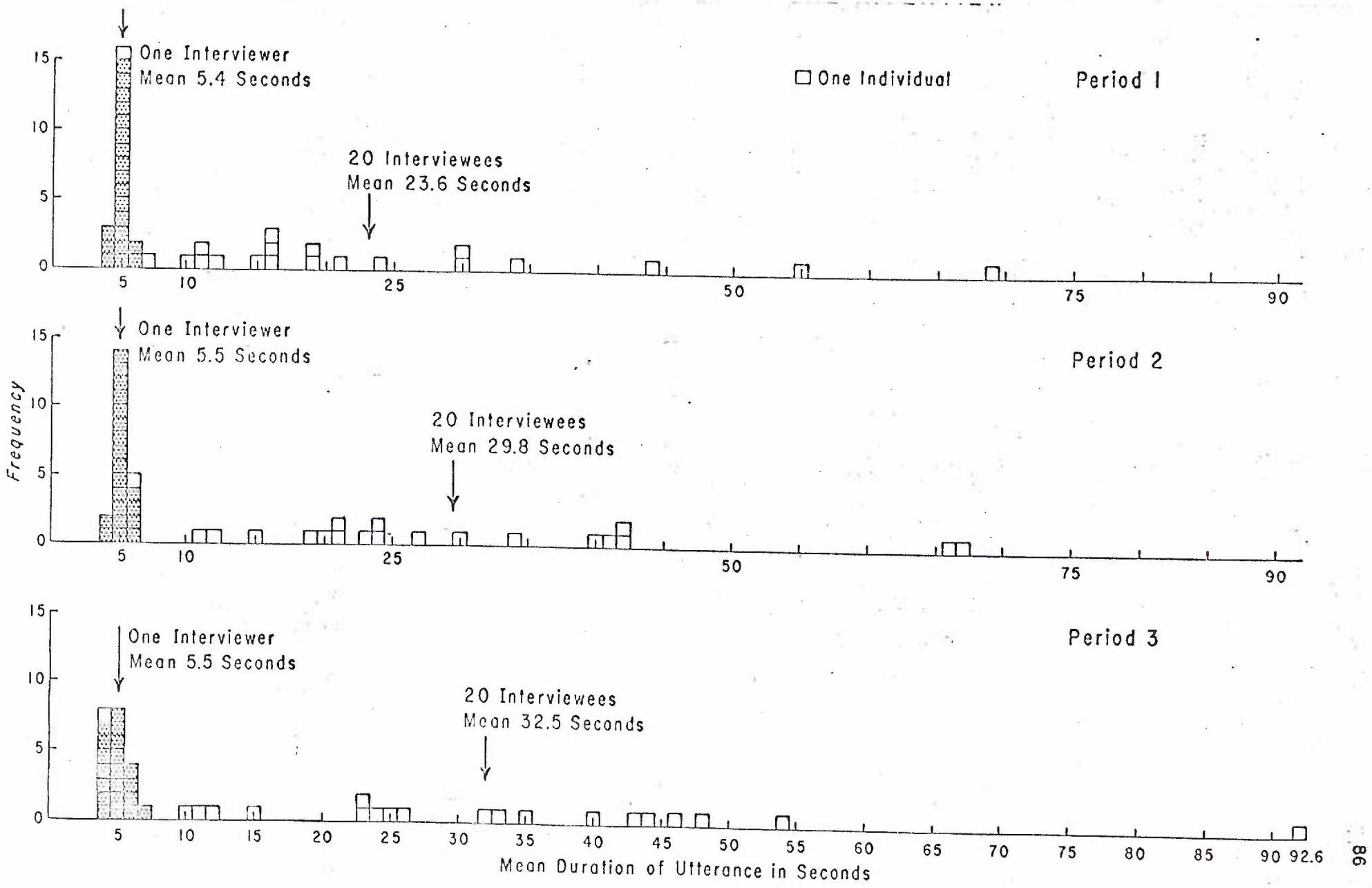
Frequency Distributions of Mean Durations of Utterance for Subjects in Each of Four Groups

Appendix F, Group A

Distribution of Mean Duration of Utterance During

3 Periods for 20 Individuals and for One Interviewer

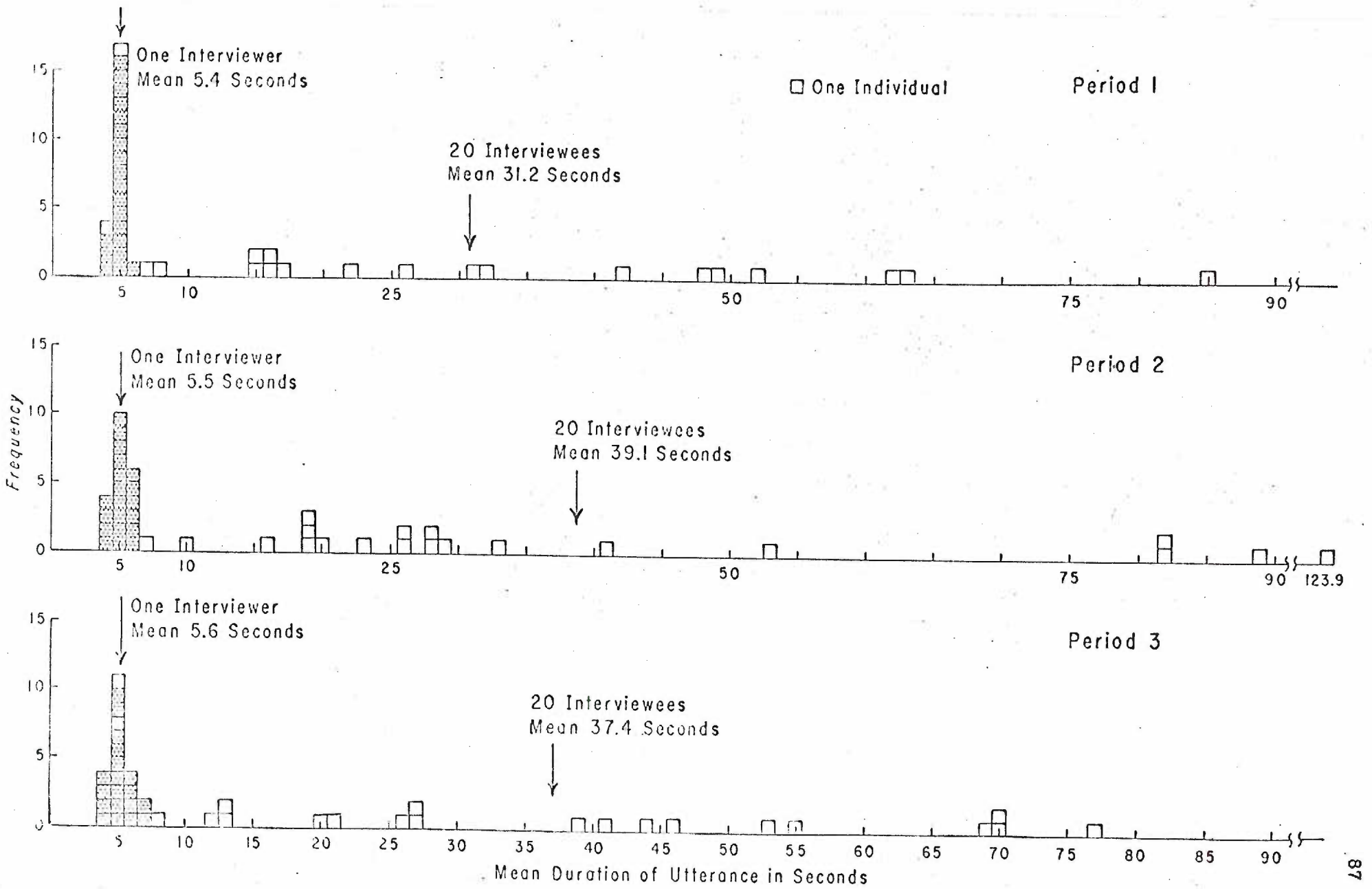
Lie Instructions: Just Before Interview


One Interviewer
Mean 5.4 Seconds
One Individual
Period 1
20 Interviewees
Mean 23.6 Seconds
One Interviewer
Mean 5.5 Seconds
Period 2
20 Interviewees
Mean 29.8 Seconds
Frequency
One Interviewer
Mean 5.5 Seconds
Period 3
20 Interviewees
Mean 32.5 Seconds
Mean Duration of Utterance in Seconds

Appendix F, Group B

Distribution of Mean Duration of Utterances During 3 Periods for 20 Individuals and for One Interviewer

Neutral Instructions: Just Before Interview

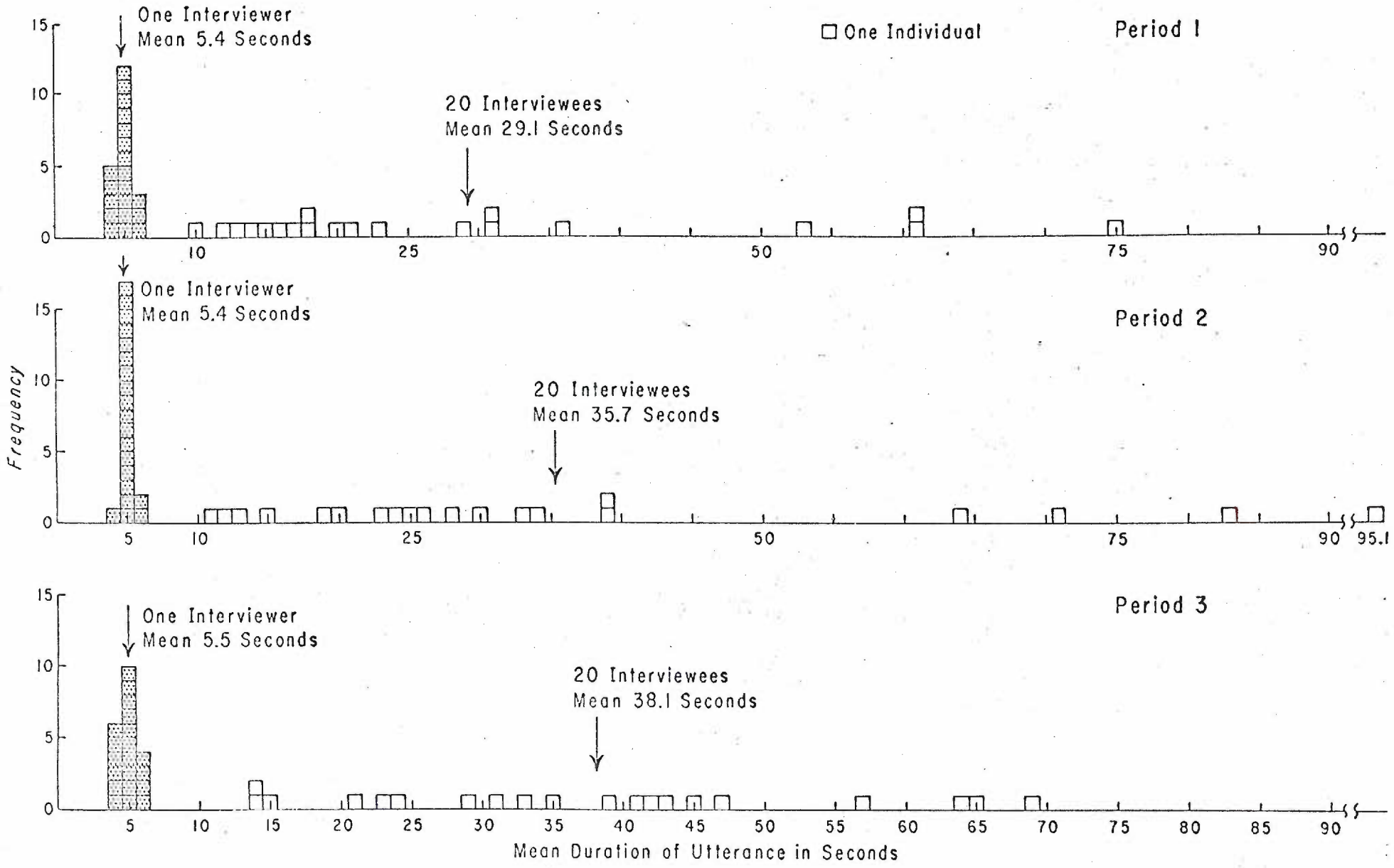

One Interviewer
Mean 5.4 Seconds
One Individual
Period 1
20 Interviewees
Mean 31.2 Seconds
One Interviewer
Mean 5.5 Seconds
Period 2
20 Interviewees
Mean 39.1 Seconds
Frequency
One Interviewer
Mean 5.6 Seconds
Period 3
20 Interviewees
Mean 37.4 Seconds
Mean Duration of Utterance in Seconds

Appendix F, Group C

Distribution of Mean Duration of Utterances During

3 Periods for 20 Individuals, and for One Interviewer

Lie Instructions: In Middle of Interview

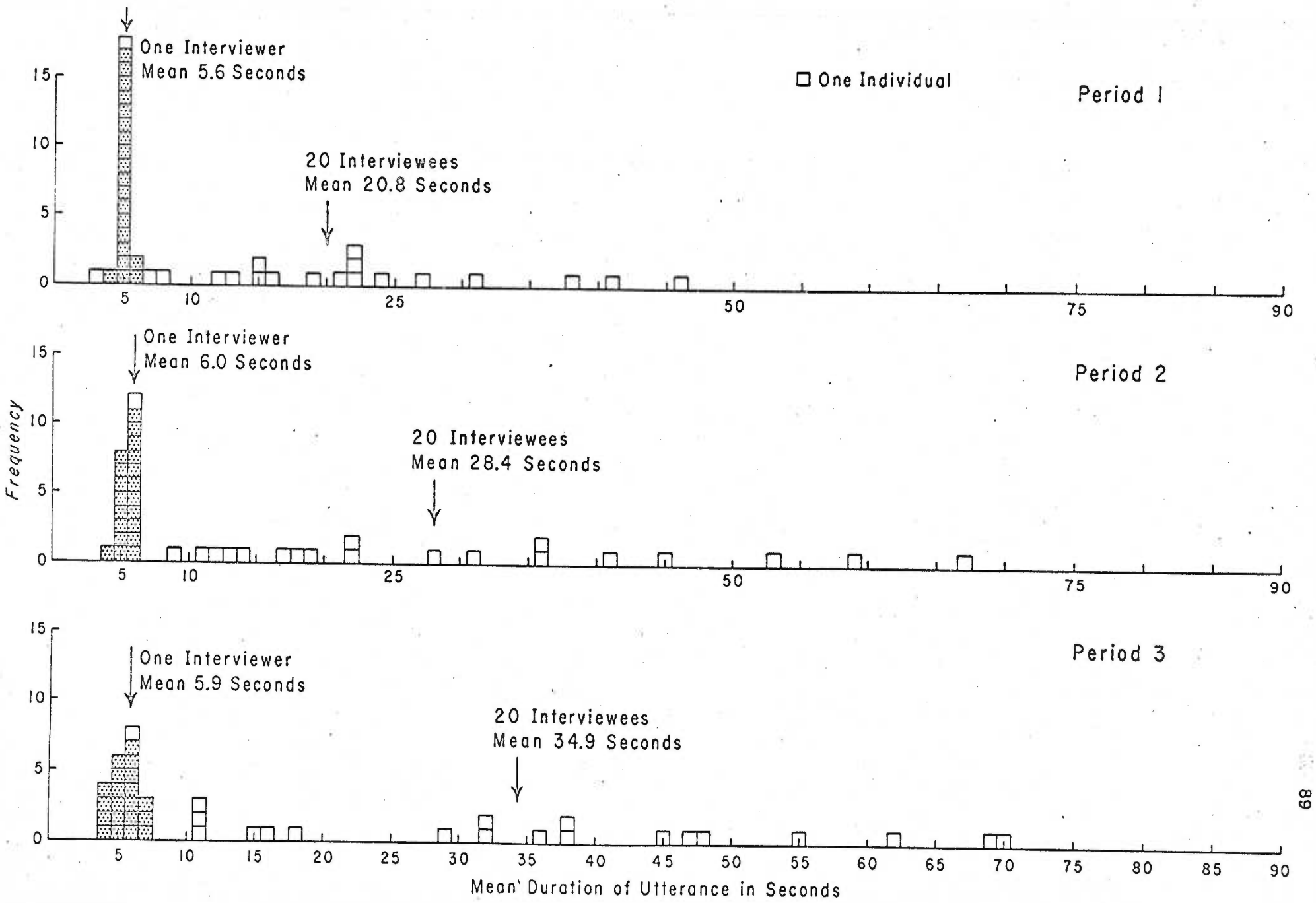

One Interviewer
Mean 5.4 Seconds
One Individual
Period 1
20 Interviewees
Mean 29.1 Seconds
One Interviewer
Mean 5.4 Seconds
Period 2
20 Interviewees
Mean 35.7 Seconds
Frequency
One Interviewer
Mean 5.5 Seconds
Period 3
20 Interviewees
Mean 38.1 Seconds
Mean Duration of Utterance in Seconds

Appendix F, Group D

Distribution of Mean Duration of Utterances

During 3 Periods for 20 Individuals, and for One Interviewer

Neutral Instructions: In Middle of Interview


One Interviewer
Mean 5.6 Seconds
One Individual
Period 1
20 Interviewees
Mean 20.8 Seconds
One Interviewer
Mean 6.0 Seconds
Period 2
Frequency
20 Interviewees
Mean 28.4 Seconds
One Interviewer
Mean 5.9 Seconds
Period 3
20 Interviewees
Mean 34.9 Seconds
Mean Duration of Utterance in Seconds