AN EXAMINATION OF ORDER EFFECTS IN IMPRESSION FORMATION

by

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INTRODUCTION

The question of what effect the order of presentation of information will have on evaluations formed on the basis of that information is not a trivial one. In fact, the question is very reasonable when we consider how information of another's behavior is received in everyday life. Surely we do not receive behavioral information all at once; rather, this information is received in a sequential manner. For example, if a new acquaintance tells us that he would like to go to the ballgame with us but does not like the other people that usually accompany us we have received two pieces of information in a sequential manner. First we have learned that this new acquaintance enjoys our company and second that he dislikes our friends. The effect of the second information on the first or the first on the second is determined by the particular attributions made by the perceiver and is the main concern of the order effects field. Through this concern an attempt is made at achieving a better understanding of how people form impressions of others.

In studying order effects experimenters usually present subjects with personality trait information of both positive and negative valence. When this bivalent personality information is presented in an uninterrupted serial manner, subjects' evaluation of the person described by that

information will be consistent with the valence of the first information received, that is, a primacy effect will be found (Asch, 1946; Luchins, 1957; Anderson, 1965; Anderson and Barrios, 1961). However, this primacy effect may be eliminated by presenting personality information in any way other than an uninterrupted serial manner (Luchins, 1957b; Anderson and Hubert, 1963). This being the case, the nature of the order effect, be it primacy or recency, is dependent upon the demands made of subjects and is in itself a rather trivial issue. Rather, the main concern of researchers in the order effects field has been the outlining of a general theory of how subjects process information in a serial integration task; any such theory should be able to explain primacy effects as well as the absence of primacy.

In this paper we will examine the processing strategy employed by subjects in dealing with sequentially presented personality information. In order to attempt a better understanding of subjective processing strategies a relatively broad sampling of dependent measures will be assessed which should relate to such strategies.

In the next section of this paper the three most popular explanations which have risen to explain order effects, the change of meaning, attention decrement, and discounting hypotheses, will be briefly reviewed. Following this review the theories will be compared and contrasted so that the

reader may better understand where the theories differ. Then a number of suggestions will be made as to how we might improve these theories and in so doing gain a better understanding of how subjects do process personality trait information in a serial presentation task.

The Change in Meaning Hypothesis: In 1946 Asch conducted a series of experiments dealing with impression formation. In Experiment VI of this series Asch presented subjects with a list of six traits arranged in either an ascending order (negatively valenced to positively valenced) or a descending order (positively valenced to negatively valenced) which described a hypothetical person. In both cases a primacy effect was found, subjects' evaluations of the hypothetical person were consistent with the valence of the initial trait adjectives presented them. In Experiment VII (Asch, 1946) similar results were found. In this experiment subjects received a list of seven trait adjectives, six of which were positive in valence. The seventh trait "evasive" was inserted at either the beginning or the end of the list. The group which heard the six positive traits before hearing "evasive" wrote a more favorable impression than the group that heard "evasive" prior to hearing the six positive traits, again showing a primacy effect. Asch concluded from these two experiments that the subject, upon hearing the first term presented, sets up a direction which exerts a continuing influence on later terms in that these later terms will be

interpreted as being either positively or negatively oriented to remain consistent with the valence of the first terms. This necessitates a "change in meaning" of later terms to accomodate the context established by the first items. Asch's position is based upon Gestaltist notions; traits are not seen as independent entities but rather as part of a whole. Each trait is incorporated into a structured impression of the person being described. This incorporation involves not only an assimilation of the trait to the structure but also an accomodation of the structure to the trait. The extent to which the structure will accomodate is determined by the importance or as Asch calls it, the centrality of the trait. In the sequential task being considered in this paper later inconsistent information is assimilated into a structure determined by the first information received; this often involves a reinterpretation of the later information.

Luchins, who was also interested in the problem of primacy effects in impression formation, felt that presentation of trait adjectives was not an adequate representation of how people acquire information about another person. Therefore, in examining order effects Luchins (1957a; 1957b) used descriptive paragraphs of inconsistent behavioral sequences; again a primacy effect was found. Also of interest in the Luchins study was that the majority of people reading the inconsistent paragraph sequence were unaware of any inconsistency or felt that any inconsistency which was

present was not strong enough to require reconciliation. This finding, which is also consistent with the responses of some of Asch's subjects, led Luchins to believe that the inconsistent information, if completely attended to, would be plausably accounted for in the person being described.

Luchins interpreted the predominance of primacy effects in his study in terms of an "Einstellung" or set effect, an explanation not inconsistent with Asch's directional hypothesis. This idea, which was borrowed from problem solving literature, employs the notion that the first block of information may have accustomed or channeled the subject towards a certain view of the target person. Later information is then interpreted in the same way the first information was interpreted simply because the subject feels accustomed or comfortable in viewing the target person this way. A problem solving analogy would be a situation in which the problem solver worked on a number of problems whose solution was best achieved through an addition operation, if the solver was then presented with a problem whose solution was best achieved through multiplication, we would expect under the Einstellung effect that the subject would again resort to an addition operation. The use of the less efficient addition operation occurs simply because the solver is accustomed to approaching problems in this manner.

Attention Decrement Hypothesis: Another interpretation of the primacy effect under question has been offered by

Anderson (1965). This interpretation, known as the attention decrement hypothesis, appeals to a change in weight rather than a change in meaning of words to explain order effects. According to this position, as subjects hear each succeeding trait describing a hypothetical person the importance or weight attributed to this information follows a decreasing function. This decrease in importance is brought about by a progressive lack of attention paid to later terms. It should be noted here that the meaning or affective "scale value" of the word does not change due to context but only the amount of influence the word exerts in determining the final impression.

It follows from this attention decrement hypothesis that if the personality information is presented in such a way so as to induce the subject to attend to each item, the primacy effect will disappear and be replaced by a recency effect. This is the case since a greater weight would be given to the most recently attended to items. This has in fact been shown to be the case (Stewart, 1965; Anderson and Hubert, 1963; Anderson, 1968). For example, Anderson and Hubert (1963) had subjects recall trait information in addition to making an evaluative response. Here primacy effects were eliminated and occasional recency effects were found. This was seen as supportive of the attention decrement hypothesis in that the recall task had the effect of redistributing attention along the serially presented information and therefore

disrupting the steady decline in attention that is associated with primacy.

Anderson sees the information processing strategy of the subject as following a weighted average model. As Anderson (1965) expresses it "the response to any set (of personality adjective information) is simply a weighted mean of the scale values of the adjectives of that set. The scale value would index the location of the adjective on a favorableness dimension; the weight would represent the influence or importance of the adjective in the total impression" (p. 6, parentheses mine).

The attention decrement hypothesis appeals to a passive processing strategy on the part of subjects, that of inattention. While Anderson supported this position he also introduced a somewhat different explanation of primacy effects, that of discounting. This approach will be reviewed now.

Discounting Hypothesis: The discounting interpretation of order effects, like the attention decrement position, is based on a change in weight notion. However, unlike the passive change in weight of later information which the attention decrement position hypothesizes, the discounting position maintains that subjects will give lower weight to a word because it is inconsistent (i.e. of different polarity). In discounting therefore the subject is attending to all words but is actively assigning lower weights to perceived inconsistent information.

The discounting interpretation of order effects grew out of a study by Anderson & Jacobson (1965). Here subjects were presented with a list of three adjective traits simultaneously. The experimenters found that when there was an inconsistency in valence among the three traits the inconsistent trait had little influence. Although the simultaneous presentation of the three traits does not make this particular study relevant to an investigation of order effects, Anderson (1968) felt that a discounting process similar to the one observed in the 1965 study was operative in earlier order effects studies which produced primacy. To investigate this Anderson presented subjects with stimulus information of only one valence, but of different scale value. For example, one block of information contained three highly favorable trait adjectives (H adjectives), the other block three moderately favorable trait adjectives (M+ adjectives). If set HHH+M+M+ were compared to set M+M+M+HHH we would expect, if primacy were operative, the first set to be evaluated more favorably than the second set. If recency were operative we would expect the second set to be evaluated more favorably than the first. Recency effects were obtained regardless of whether the subject responded continuously (cumulatively after every adjective), or finally (after all six adjectives). Since a primacy effect was not found when the information was of the same valence, Anderson concluded that the primacy effects found by

earlier studies were due to a discounting of semantically or affectively inconsistent information of lower weight.

Comparison of Order Effects Theories

We have reviewed three explanations of how subjects process personality information in an uninterrupted serial presentation task. Asch was seen as the main proponent of a change in meaning explanation in which the subject was seen as taking the context of the whole person into account when interpreting the meaning of personality adjectives. This position has come under attack especially by Anderson (1965, 1968, 1971) who sees a theory based on change of meaning as untestable and as lacking parsimony. Anderson maintains that the meaning of a word is independent of context and that any order effects obtained are due to differential weighting of component stimuli by the subject. This differential weighting was seen as a passive process of inattention to certain words in 1965. Then, in 1968, Anderson revised his position somewhat by stating that the subject may be more active and actually discount certain information to arrive at some order effect. However, Anderson's more current work (1971, 1973) seems to have returned to the attention decrement hypothesis as the favorite explanation of primacy effects.

Statement of Problem

Following the above review it becomes apparent that in order to better understand how subjects arrive at the impression they do (be it primacy, neutral, or recency directed) a clearer understanding of how subjects are processing information in a serial presentation task is needed. The present study hopes to examine the processing strategy more closely not only through making relevant experimental manipulations but also by including a number of dependent measures which should be reflective of the processing strategy subjects use. In addition, although the present study is not designed to support either the Asch or Anderson position, this study of processing strategies may shed some light on that debate.

In the next section of this paper the experimental manipulation to be employed in this study, that of inter-stimulus interval, and an individual differences variable, cognitive complexity will be reviewed.

Effect of inter-stimulus interval on primacy: Until very recently (Hendrick, Constantini, McGarry, & McBride, 1973) the possibility that inter-stimulus interval might have an effect on processing strategies and subsequent evaluations has for the most part been ignored. We might expect that regardless of the length of the inter-stimulus interval the subject may feel time pressure due to the fact that the experimenter presents trait adjectives at

some steady pace. This time pressure may influence how subjects process information in that it may become burdensome to process later information into one impression in a short period of time.

Most of the experiments above present information at a steady rate of 1 to 3 seconds per word. In experiments where subjects are asked to repeat the word upon presentation (Hendrick and Constantini, 1970), the succeeding word usually follows immediately upon the subject's repetition. As Hendrick and Jones (1972) comment in a critical discussion of the Hendrick and Constantini paper, perhaps results would be different if subjects were given enough time between stimulus items to let information "sink in". Verbal learning experimenters find increased recall for items presented both visually (Sitterly, 1968) and auditorally (Miscik, Smith, Hamm, Deffenbacher, and Brown, 1972) with increased inter-item interval. Perhaps recall differences would be unrelated to impression differences as Anderson and Hubert imply, but this notion should certainly be looked into. Further support for the notion that time involved in presentation of information may be important comes from an unpublished thesis by L. Supnik presented in Crockett (1965). In this experiment time pressure was thrust upon the subject by telling him that his performance in a timed qualifying test for participation in the experiment proper was too slow but that he would

be reluctantly accepted. Subjects in this time pressure condition were subsequently instructed to work as fast as they could in the experiment proper. These subjects showed significantly less integrative power in the face of contradictory information than a non-pressured control. An analogous time pressure may be felt by subjects hearing information presented at the experimenter's rate.

In work dealing with the typical impression formation order effects paradigm Hendrick et al (1973) found inconsistent results as a function of inter-stimulus interval; they concluded that increased inter-stimulus time had no effect on primacy. However, these authors did impose set time limits in all conditions. It may be that if the inter-stimulus interval is an important variable in the order effects research, the length of that interval may not be as disruptive a factor as the fact that there <u>is</u> some set time interval in which the subject must process information. If this were the case than the manipulation made by Hendrick et al involving 3 vs. 5 second inter-stimulus intervals would not be a strong one.

If time pressure did have the effect of hindering the processing of later information it might also be expected that later information would be recalled less often. However, the opposite was found by Anderson & Hubert (1963). These authors, although inferring a real primacy effect of impression response in the unwarned recall trial, found a

recency effect in the recall task for that same trial. It would seem that memory for items in an impression formation task is unrelated to memory of items in a recall task and this is in fact what Anderson and Hubert concluded. These authors posit two separate memory systems, one for recall and the other for impression formation. If this is the case and a memory system is active in impression formation it may be that increased time would allow for increased rehearsal and processing ability on the part of the subject and perhaps result in a reduction of order effects.

The present study examines the effects of a time variable on order effects obtained in impression formation. It is felt that due to time pressure the presentation of information at a fixed experimental rate might have the effect of interfering with the processing of later information. This interference could result in the primacy effects usually obtained in impression formation studies. If items in a stimulus list were presented at a subject-paced rate it is felt that primacy effects would be reduced relative to effects obtained from a pre-planned rate of presentation.

The literature reviewed to this point is concerned with finding a general subjective strategy employed in processing information obtained about other people. The fact that individual differences may be operating in this process is for the most part overlooked by the above

investigators. Work has been done which relates order effects in impression formation to one individual differences variable, that of cognitive complexity (Mayo & Crockett, 1964; Nidorf & Crockett, 1964). Before reviewing this work an analysis of cognitive complexity is in order.

Cognitive Complexity: Crockett (1965) has done extensive work with the individual differences variable of cognitive complexity, especially as related to the interpersonal relationships domain. This work is strongly influenced by Werner's comparative-developmental theory (1957) as well as Kelly's theory of personal constructs (1955; see Crockett, 1965). Crockett defines a complex cognitive system as one which a) contains a relatively large number of constructs and b) has a relatively extensive organization of those constructs within a system of relations in which certain constructs are superordinate to others. The development of this cognitive system, consistent with a Wernerian theoretical framework, is from a global diffuse state to a more differentiated organized state; this progression occurs through interaction or experience with the particular domain in question. This necessarily implies that cognitive complexity is not generalizable from one domain to another but rather is a function of ones past experience with that particular domain.

In the area of interpersonal relations a highly complex person would possess a highly integrated system of

personal constructs. These constructs would be hierarchically organized in that certain traits would be superordinate to others and would provide systematic relationships for more subordinate traits which might otherwise be incompatible. A noncomplex person on the other hand would possess a simpler interpersonal cognitive system with less hierarchic organization. Organization of traits through this simpler system would be more diffuse and lacking of the systematic relationships characteristic of traits in the more complex cognitive system.

The present author sees the notion of a superordinate construct as playing an important role in examining subjective strategies employed in processing stimulus information. Crockett (1965) states that one function of a superordinate construct is to "provide a rationale for the presence of two qualities of opposite valence in some one person's behavior" (p.65) and further that a highly complex person, who is able to organize information about a superordinate construct, should be better able to incorporate bivalent information into one integrated impression. Evidence supporting this notion can be found in a study by Mayo and Crockett (1964). In this study subjects were presented with first one univalent block of information and asked to form an impression and than a block of information opposite in valence to the first and asked to write a final impression. Both complex perceivers (highs) and noncomplex perceivers (lows)

gave univalent responses in the first impression. In the final impression lows shifted the valence of their impression to remain consistent with the most recent block of information received but highs moved towards ambivalence. This finding points to the value of complexity in accounting for a share of the variance in impression formation studies.

In further support of this statement Nidorf and Crockett (1965) ran an extension of the Mayo and Crockett study. Nidorf and Crockett examined written impressions of the target person; their impressions revealed that highs dealt with the conflicting information by integrating the information into a unified impression, whereas lows formed an unintegrated univalent impression. Further support can also be found in a study by Rosenkrantz and Crockett (1965) and Klyver, Press, and Crockett (in press). These results show that a superordinate construct provides a context into which inconsistent information may be incorporated. This notion would necessitate a restructuring of affective meaning of certain stimulus traits so as to accommodate context, a notion consistent with the change of meaning interpretation of Asch. The absence of a context into which inconsistent information could be incorporated, a dilemma in which a noncomplex person would find himself, may result in a simple aggregation of constructs and a subsequent discounting of later information to arrive at a univalent impression. Therefore we would expect individual differences with respect

to subjective strategy employed in processing inconsistent information. Furthermore, if the time variable discussed earlier does indeed affect processing ability, we would expect that variable to interact with complexity. As was hypothesized earlier time pressure is seen as inducing the primacy effect by interfering with the processing of later information. It was also hypothesized that the primacy effect is carried mainly by noncomplex subjects. This being the case, time pressure should affect noncomplex subjects more so than complex subjects.

The above studies point to the need to assess subjects' cognitive structure in an impression formation task; cognitive complexity seems to be valuable in accounting for a share of the variance in primacy studies. The failure of earlier studies on order effects to come up with ambivalent impressions may be due to a statistical artifact, the averaging of subjects scores within conditions to come up with an overall effect. If half of the subjects within any condition (as posited here, highs) gave ambivalent evaluative responses and half (lows) showed marked primacy effects an overall averaging would show a primacy effect. This averaging of subjective responses does not explicitly examine how the subject is processing information. The work done in the order effects field which concerns itself with cognitive complexity seems to be a step in the direction of discovering subjective strategies of dealing with bivalent information.

In summary, this research is an investigation of the processing strategy employed by subjects in arriving at final evaluative impressions of target people. Through this analysis we may better understand the primacy effect or lack of it found in the order effects field. In studying this area it is felt that employing such variables as inter-stimulus interval and cognitive complexity will be beneficial in arriving at a better understanding of processing strategies.

METHOD

Subjects: Subjects were 92 volunteers selected from a population of 140 freshmen psychology students (70 male and 70 female) who had participated in a pre-test session. Each subject was run individually in the experiment proper. Six subjects had to be discarded when it was found that they thought they had heard some word other than the one presented them. As a result 86 subject's protocols were analyzed. Subjects received course credit for participation.

Measure of cognitive complexity: Cognitive complexity was measured using a variation of the Role Category Questionnaire described in Crockett (1965). In this study, three role descriptions were provided to the subject (peer you like, peer you feel neutral towards, and peer you dislike) and he was to fit three people known to him to these role descriptions. Subjects were then asked to describe these three people as fully as they could paying particular attention to the habits, beliefs, way of treating others, mannerisms, and similar attributes possessed by each person "so that a stranger might be able to determine the kind of person he is from your description". Subjects were given four minutes to so describe each of the three role fitted people. As defined by Crockett (1965), the number of constructs or trait characteristics employed by the subject in his description of the target person was that subjects'

measure of cognitive complexity. From the original pool of 140 subjects, the 46 subjects who had scored highest on the cognitive complexity measure and the 46 subjects who had scored lowest on the measure were selected for participation in the experiment. This made up the 92 volunteers alluded to above.

Procedure: Subjects received personality trait information in either an ascending (LLLHHH) or descending (HHHLLL) block presentation. Half of the subjects in both the ascending and descending block conditions received trait information at a steady pace determined by the experimenter (approximately a 2 second inter-stimulus interval); the remaining subjects in the block condition received information at a self-paced rate.

The stimulus information consisted of two sets of six descriptive adjectives, each set containing three positive and three negative valenced terms. One set, used by Asch in his 1946 study, is reproduces here in the ascending order:

envious, stubborn, critical, impulsive, industrious, intelligent

The second set was selected from those employed by Anderson and Barrios (1961) and was the set that showed the most primacy equally carried by both the ascending and descending orders. That set is reproduced here in the ascending order:

unruly, faultfinding, crafty, smart, scholarly, efficient

In each of the 8 conditions half the subjects were randomly designated to receive one set and half the other, with the stipulation this be counterbalanced over sex.[1]

Prior to receiving the stimulus information subjects in the experimenter-paced condition were given the following instructions:

> I am going to read to you a list of trait characteristics which describe one person; after hearing this list I want you to decide how much you think you would like this person. When you have made up your mind I would like you to rate how much you would like this person on a likableness scale that will be provided to you. After you make this rating I want you to write down in as much detail as possible what your impression of this person is. In your written impression I am interested in what kind of person you think the character described is; what are his habits, manners, ways of treating others. This list of characteristics will be read to you only once, so if you have any questions as to what your task is please ask them now.

Subjects in the self paced conditions were given the same instructions but were also told that "the adjectives will be presented one at a time, when ready to hear each succeeding characteristic indicate so by making a sound with a clicker".

[1]The lists employed in this study were examined in a pretest situation on 20 subjects who were not involved in the experiment proper. It was determined that both lists showed strong primacy effects.

A clicker was then supplied to the subject and he was asked to try it before proceeding.

Following these instructions subjects were presented with and familiarized with a rating scale on which they were to make their judgement. The scale consisted of a 9 inch line with defined end points (on the left, like very much; on the right, like not at all). The mid point on the scale was defined by a small slash and it was explained to subjects that a mark here would indicate neither like nor dislike.

Prior to presenting the stimulus list to the subject a tape recorder was turned on so as to measure at a later time the latency of the subject in requesting the next word in the self paced condition. The stimulus list was then read off, the tape recorder was turned off and the subject proceeded to evaluate and write an impression of the target person.

When the subject was through with the written impression it was handed in to the experimenter and a blank sheet of paper was handed to the subject. The subject was now requested to write down all the words that had been presented to him in describing the fictional person. This recall task was used to determine which traits the subject remembered. When this was collected by the experimenter another sheet of paper, with six 4 inch lines printed on it was handed to the subject. Each line was labelled "positive" on the

extreme left and "negative" on the extreme right. Above each scale was a number corresponding to its rank position on the page. The subject was then read the following instructions:

> The six numbers on this sheet correspond to the six trait words that were presented to you in describing a person. I am going to ask you to elaborate on how you used each of these words in arriving at your impression of this person. Tell me briefly (two or three sentences for each word) how each word fit into your overall impression. In other words, what did this word tell you about this person. We also want you to rate how much you like this trait in this person, was it positive or negative and to what degree. Remember, everything you do in this task is in relation to the person you described--you are telling me about how you used this word for this person. If you did not use one or any of the words in arriving at your impression indicate so and I will go on to the next word.

The experimenter initially read off the stimulus words in the same order they were present in the subject's impression. Any words not used by the subject were read last. This measure was designed to get a report from the subject as to how he used each of the stimulus items in arriving at a final impression.

When subjects had completed this task they were asked to rate each word again, on the same scales, as to how positive or negative that word was as it existed alone.

Dependent measures: The two main dependent measures were the evaluative measures of primacy and extremeness. The primacy measure was the distance in inches from that pole of the scale consistent with the valence of the last

information presented to the subject to the subject's evaluative rating. In this way a high score always reflected primacy and a low score recency. It should be recalled here that the mid point of this rating scale was defined for the subject as a neutral point. The extremeness score was the absolute distance from the neutral point to the subject's rating. This reflected the degree of ambivalence shown by subjects regardless of whether it was in a primacy or recency direction.

The structural measures reflected the two aspects of the subject's cognitive structure, differentiation and organization, as described by Crockett (1965). These measures were obtained through a content analysis of the subjects' written impression of the target person and reflect the degree to which the written impressions are either univalent, an aggregate of inconsistent information, or an integration of inconsistent information (Crockett, Press, & Delia, unpublished manuscript).

The recall measure reflected the memory for items of subjects immediately following a written impression based on those items (Anderson & Hubert, 1963).

The latency measure reflected the time used by subjects between stimulus words in the self paced condition of the serial presentation task.

The component rating measure reflected the value given trait stimuli out of context as well as in the context of

the stimulus person being described. Through this component rating measure the value attributed to each component trait, both in and out of context, may be examined.

All dependent measures were analyzed in a multivariate analysis of variance (Jones, 1966). Univariate analyses were also conducted on each dependent measure.

RESULTS

Results relevant to the three hypotheses presented in the introduction of this paper will be so noted. A summary of these hypotheses follow:

Hypothesis 1). The time allowed to process information describing the target person will have an effect on the evaluation of that target person. Time pressure will result in an inability to process later information and result in primacy, a subject paced presentation of information will reduce the primacy effect.

Hypothesis 2). Subjects will differ in their processing strategies; complex perceivers will integrate information more extensively and arrive at a more ambivalent final impression than noncomplex perceivers. Noncomplex perceivers will be less well able to integrate inconsistent information and will thus base their evaluation of the target person on the first information received.

Hypothesis 3). Time pressure will have more of an effect on noncomplex people than on complex people since time pressure was seen as inducing primacy (Hypothesis 1) and noncomplex people

were seen as showing greater primacy (Hypothesis 2).

Results will be presented in two sections; in the first section the multivariate analysis employing the independent variables of complexity, order and time will be presented; on the basis of this analysis the results from the univariate analyses will be presented. In the second section the multivariate analysis employing the complexity and order variables will be presented. This analysis also takes into account the latency measure. Latency measures were collected for subjects in a self-paced time only and therefore only those subjects in the self paced conditions are involved in this analysis. As was the case in the first section, using the multivariate analysis as a base, appropriate results from the univariate analyses will be presented.

Multivariate analysis employing complexity, order and time variable

A multivariate analysis was done on the dependent measures of primacy, extremeness, differentiation, organization, recall, and component ratings using between group indices of complexity, order, and time (see table 1). As can be seen in table 1 both the main effect of cognitive complexity and the complexity by order interaction discriminated over the composite of the dependent measures used.

Cognitive Complexity

Evaluative measures of Primacy and Extremeness: Primacy

Table I. Summary of multivariate analysis employing Complexity, Order, and Time with 12 and 67 degrees of freedom.

Source	F	p
Complexity (Cc)	2.342	0.01
Order (Or)	1.439	0.17
Time (Ti)	1.383	0.20
Cc x Or	2.080	0.03
Cc x Ti	0.940	0.51
Or x Ti	0.805	0.64
Cc x Or x Ti	1.122	0.36

was measured in such a way that any rating higher than 4.5 was in the direction of "primacy", the higher the rating the more primacy shown. Since the scale on which subjects evaluated the target person ranged from "like very much" on the extreme left to "like not at all" on the extreme right a high primacy score in the ascending conditions always signified a negative evaluation whereas a high score in the descending conditions always signified a positive evaluation. If one were interested in viewing only the raw evaluative ratings, the primacy scores in the descending conditions would be subtracted from 9; in the ascending conditions the primacy scores and evaluative ratings are the same.

A univariate analysis indicated that as was predicted in hypothesis 2 noncomplex subjects tended to show more primacy than did complex subjects (means of 5.03 and 4.43 respectively; $F\ (1,78) = 2.996$, $p < .09$).

Extremeness scores could range from 0 to 4.5 with the higher score reflecting a more extreme rating. A univariate analysis of extremeness scores indicated that, contrary to hypothesis 2, this measure did not distinguish between levels of complexity. This indicates that while lows generally showed more primacy, highs' ratings were overall as evaluatively extreme as were lows.

Differentiation: It will be recalled that the structural measure of differentiation was obtained by counting the number of constructs subjects employed in their written

impression. The univariate analysis for this dependent measure showed the expected differences across complexity; highs wrote more differentiated impressions than lows (mean number of constructs employed were 10.13 and 7.12 respectively; $F\ (1,78) = 9.959$, $p < .01$).

Organization: A second structural measure taken from the written impressions was level of organization. This was the degree to which subjects resolved the apparent inconsistencies of the traget person. Here the scores could range from an aggregation of constructs with no apparent recognition of inconsistency to resolution of inconsistency through hierarchic integration of constructs. Here again, a univariate analysis showed the expected differences across complexity; highs wrote more highly organized impressions than did lows (means of 9.22 vs. 7.06; $F\ (1,78) = 18.214$, $p < .001$).

Recall: It was assumed that the recall measure would reflect certain aspects of the processing strategy; that is, if people process more information they should also recall more of the informational input. It should be noted here that in order for subjects to be credited with recall of a word some form or tense of that word had to be recalled. Synonyms of words were not regarded as correct responses.

The unwarned recall task followed the written impression task. Here again a univariate analysis was performed for the complexity variable using block (negative words vs. positive

words) as a within variable. It was found that complex people remembered more words than did noncomplex people (means of 3.68 vs. 3.22 words remembered per list of 6 words, F (1,78) = 3.684, $p < .06$). Unexpectedly there was also a marginally significant complexity by block interaction (F (1,78) = 3.737, $p < .06$). As can be seen in table 2 complex compared to noncomplex people remembered significantly more of the negative words (means of 1.99 and 1.52 words remembered per block of three words respectively), but did not differ in the number of positive words remembered (means of 1.69 and 1.70 respectively).

Component ratings measure: The dependent measure of component ratings did not distinguish between complexity levels in the univariate analysis.

Summary: The results indicated that hypothesis 2 drew general support. Highs not only processed information differently than did lows (as was seen in the structural and recall dependent measures) but also tended to give different evaluative ratings as was seen in the primacy measure. However, highs and lows did not differ in the degree of directionality shown, as was seen in the lack of relationship for extremeness scores. This later finding will be examined more closely within the complexity by order interaction.

Complexity by Order Interaction

Evaluative measures of Primacy and Extremeness: While a

Table II. Mean number of words recalled per block of 3 adjectives as a function of Complexity and Valence.

Valence of words recalled	Complexity: high	Complexity: low	
negative	1.99	1.52	1.76
positive	1.69	1.70	1.70
	1.84	1.61	

univariate analysis on primacy scores showed no difference over complexity-order, a univariate analysis on extremeness scores did show a complexity by order interaction which approached significance (F (1,78) = 3.714, $p < .06$). This interaction reflected the fact that high complex people were more extreme in the ascending than in the descending condition (means of 1.79 and 0.98 respectively) while lows showed no differences over order (1.47 ascending vs. 1.48 descending, see table 3). This interaction indicates that although there were no differences in extremeness over complexity levels as was reported earlier, high complex people were more extreme in their ratings when the negative information was presented first. On the other hand, low complex people were unaffected by the order of presentation of information in the extremity of their ratings. The implications of this finding will be discussed in a later section of this paper.

It should also be noted here that although no main effect or interaction involving time reached significance in the multivariate analysis performed, a univariate analysis revealed that the complexity by order by time interaction was significant for primacy scores only (F (1,78) = 8.456, $p < .01$, see table 4). As can be seen in table 4 high complex subjects under a self paced time showed recency effects regardless of order. On the other hand in an experimenter paced time highs showed primacy in the ascending and recency in the descending condition; in other words, under time pressure highs seemed

Table III. Extremity of evaluative rating as a function of Complexity and Order.

Order	Complexity: high	Complexity: low	
ascending	1.79	1.47	1.63
descending	0.98	1.48	1.23
	1.39	1.48	

Table IV. Mean evaluations in the Complexity x Order x Time interaction for primacy (raw evaluation scores in brackets).

Ascending Order

	High Complex	Low Complex	
Self-paced Time	3.72 (3.72)	6.20 (6.20)	4.96
Experimenter-paced Time	5.84 (5.84)	4.54 (4.54)	5.19
	4.78	5.37	

Descending Order

	High Complex	Low Complex	
Self-paced Time	4.06 (4.94)	4.53 (4.47)	4.29
Experimenter-paced Time	3.87 (5.13)	4.66 (4.34)	4.26
	3.96	4.59	

to be most influenced by the negative words. Low complex people do not show any systematic effects over time-order cells. This result, though unexpected, does pose a number of interesting implications; these will be discussed in a later section of this paper.

Component ratings measure: A univariate analysis was run on the difference between subjects' normative and context ratings of each of the six traits presented; valence of trait was used as a within variable. In this analysis the size of the difference indicated the amount of movement and the sign (+ or -) of the difference indicated the direction of the movement; a + sign would indicate that the word became more positive in context and a - sign that it became more negative.

The complexity by order by valence interaction ($F(1,78) = 4.845$, $p < .05$, see table 5) indicated that highs shifted the positive words to a much greater extent than the negative words regardless of the order of presentation. Furthermore, this shift for complex perceivers is consistent with the positive context effect in that positive words became more negative in context (shifts of -0.84 inches ascending order; -1.45 inches descending order on a 4 inch scale) and negative words more positive (shifts of 0.09 inches ascending and 0.53 inches descending on a 4 inch scale). Noncomplex perceivers in the ascending order also shift words as would be expected under the influence of a positive context effect (shifts of 0.44 inches negative words and -1.02 inches positive words).

Table V. Means of the Complexity x Order x Valence interaction of difference scores (a positive score indicates that words became more positive in context, a negative score that they became more negative).

Ascending Order

	High Complex	Low Complex	
Negative Words	0.09	0.44	0.26
Positive Words	-0.84	-1.02	-0.93
	-0.37	-0.29	

Descending Order

	High Complex	Low Complex	
Negative Words	0.53	0.56	0.55
Positive Words	-1.45	0.40	-0.48
	-0.46	0.48	

However, in the descending condition noncomplex perceivers shift all words in the positive direction (shifts of 0.56 inches negative words and 0.40 inches positive words). These findings will be discussed in a later section of this paper.

Other dependent measures: The other dependent measures of differentiation, organization, and recall showed no significant effects for the complexity by order interaction in the univariate analyses performed.

Multivariate Analysis employing Complexity and Order variables

A second multivariate analysis was run using only those subjects who were in the self paced time condition. Again the complexity main effect and the complexity by order interaction approached significance (see table 6). However, univariate analyses indicated that the latency measure contributed no new information towards the problem under investigation.

Table VI. Summary of multivariate analysis employing Complexity and Order with 18 and 22 degrees of freedom.

Source	F	p
Complexity (Cc)	1.884	0.08
Order (Or)	1.355	0.25
Cc x Or	2.656	0.02

DISCUSSION

The present investigation was designed to examine the processing strategies employed by subjects in an impression formation task involving an uninterrupted serial presentation of personality trait information. Other studies examing this same issue have found that subjects will usually be disproportionately affected by the first information received, that is, they will show a primacy effect (Anderson, 1965; 1968; 1973; Anderson & Barrios, 1961).

In the present experiment this same primacy effect was found but it was small and nonsignificant. While the primacy effect was not replicated, a number of implications presented themselves in the present experiment which will help us better understand how subjects process information in a serial integration task. We will now turn to the two manipulations employed in the present experiment, that of time (inter-stimulus interval) and cognitive complexity, and discuss the implications of any findings which may help us better understand subjective processing strategies.

Cognitive Complexity and its interaction with Order: In the present study complex differed from noncomplex subjects along a number of dependent measures; highs tended to show less primacy, wrote more completely integrated impressions, and remembered more negative words than did lows. Complexity also interacted with order; highs tended to be more extreme

than lows when negative information was presented first while being less extreme than lows when positive information was presented first. With respect to component ratings highs shifted positive words to a much greater extent than they did negative words regardless of order while lows differed over order. Each of these results will be discussed in more detail.

Previous studies have shown that when information is presented to subjects simultaneously, highs and lows do not differ in their evaluative rating of the target person despite their differences on structural measures (Press, 1972). This implies that evaluation is not necessarily tied to the degree of integration of the impression on which that evaluation is based.

In work that has presented inconsistent information successively with evaluations following each block of information, (Mayo & Crockett, 1964; Klyver, Press, & Crockett, 1972) evaluative "shift" differences between high and low complex people were found. These studies found that noncomplex people will shift their impressions to a much greater extent than will complex subjects to remain consistent with the most recent information received. This was explained as due to the inability of noncomplex perceivers to integrate inconsistent information into an impression of one target person. Thus is appears that when new information is obtained towards an already existing impression, the degree to

which subjects can reconcile inconsistent information will have an effect on the evaluation formed.

In the present study an uninterrupted serial presentation of inconsistent information was employed. Here, on the average, noncomplex perceivers tended to show more primacy than did complex perceivers. Despite these differences however, there were no overall differences between highs and lows in the extremity of their ratings. This may indicate that while highs will give as extreme an evaluative rating on the basis of trait information as will lows, the nature of that rating will be influenced more by how information is structured and less by order than will lows' evaluations. Highs will integrate information more completely and base their impressions upon this structure; however, the evaluation does not seem to be tied to the degree of integration in that a highly integrated impression may be either neutral or oriented strongly in the primacy or recency direction. On the other hand, more often than not, noncomplex subjects, who do not integrate as completely as complex subjects, will be disproportionally influenced by the first information presented in an uninterrupted serial presentation.

In examining the nature of the integration procedure it was found through the structural measures that highs for the most part incorporated information of both valences in one impression. This incorporation involved an interconnectedness of opposite valenced traits and therefore a

resolution of potential inconsistency. Lows very often used traits of both valence in their impressions and recognized inconsistency, but seldom related these traits to each other in any systematic way. Because most subjects did employ traits of opposite valence in some way the notion of discounting as advanced by Anderson (1968) does not seem to be the best explanation of how subjects process information in the serial integration task. This becomes more apparent if we were to focus on highs only; highs explicitly use and interrelate traits of opposite valence. The attention decrement hypothesis (Anderson, 1971, 1973) must also be called into question in light of complex subjects' performance. While integrating information of both valences and all serial positions highs as a group employed the whole range of possible evaluative ratings; lows were less integrative and more primacy oriented. To explain such differences an attention decrement hypothesis would have to posit different attention spans across complexity levels, a position which does not seem warranted at this time.

The results of the present experiment do not provide a strong case for a change in meaning (Asch, 1946) explanation either. While the notion associated with change in meaning, that first items set up a direction for the interpretation of later items, does obviously not hold in the present experiment (ie. there was not strong primacy), the change in meaning hypothesis may still explain the present results

by resorting to a structural explanation similar to the one used in the present study. However, as was the case with the attention decrement explanation the change in meaning hypothesis does not adequately predict or explain the differences over complexity levels found in the present experiment. The subjects who showed the most primacy (noncomplex subjects) were those subjects whose use of later words in the list seemed to be least influenced by the use of earlier words in the list. Noncomplex subjects did not for the most part interrelate later words with earlier words yet they showed the most primacy. This therefore does not seem to be a strong illustration of the change in meaning hypothesis. It appears that no unitary theory handles the present results entirely adequately.

In examining further differences between highs and lows in their performance it was found that highs tended to be more extreme than lows when negative information was presented first while being less extreme than lows when positive information was presented first; lows did not differ over order. In a related finding highs remembered more negative words than lows while there were no differences over complexity for positive words, and with respect to component ratings highs shifted positive words to a much greater extent than they did negative words regardless of order while for lows the component ratings differed over order. It appears that to a large extent highs were centering on

negative information in performing the task put before them and in doing so were performing differently than lows. This "negativity effect" for highs may be seen as consistent with a number of other findings. In previous studies negative information was found to be of greater extremity (Peabody, 1967) and surprisingness (Feldman, 1966) than was positive information. It was also found (Jones & Davis, 1965) that negative information was seen as more out-of-role and dispositionally linked than was positive, and in line with this finding, out-of-role behavior was seen as conveying more information than was in-role behavior (Jones, Davis, & Gergen, 1961). Given these findings one might logically conclude that negative information might have greater influence on a subject who is in the process of organizing an impression (see also Press, 1972; Feldman, 1966).

If negative information does have this kind of influence and if our dependent measures are reflecting this influence we can only speculate as to why this influence is greater for highs than for lows.

Feldman (1966) states that negative information has more pulling power or modifying capacity than does positive information. That is, when negative information was paired with positive information the rating of the resulting pair was largely determined by the negative information (see also Press, 1972). This influence of negative information may be due to its dispositionally linked character (Jones & Davis, 1965)

and/or its greater informational out-of-role nature (Jones, Davis, & Gergen, 1961; Jones & Davis, 1965). Whatever the nature of the negative informations' greater influence, before this information can have any influence it must first be incorporated within an impression of the target person. If the negative information was preceeded by positive information and the processing subject did not integrate the negative into the positive it (the later information) might have little influence. Instead, subjects in the descending condition might base their impression on the first information only (positive) and either not attend to (Anderson, 1973) or discount (Anderson, 1968) the later information (negative). In the present study it was found that lows did not integrate the inconsistent information to as great an extent as highs. It was also found that lows showed more primacy than highs. It may be that by not integrating, low complex people limited themselves somewhat in the nature of the impression which could be formed. Highs, when integrating, could be influenced by either the positive or negative information. The findings in the present study indicate that highs were influenced by negative information more so than positive; this influence shows up in the evaluative measures of primacy (table 4) and extremeness (table 3) as well as in the recall measure (table 2) and the component ratings measure (table 5). We will now examine more fully the nature of this influence.

In the extremeness measure (see table 3) it was found that highs were more extreme in their evaluative ratings when negative information was presented first while lows did not differ over order. Press (1972) found that negative information which is integrated into a positive impression will change that impression more than will positive information integrated into a negative impression. Again, the motivational out-of-role nature of negative information was offered as an explanation for this finding (see Press, 1972). If positive information is characteristic of in-role behavior (Jones & Davis, 1965) and in-role behavior conveys little information (Jones, Davis, & Gergen, 1961) we would expect any initial impression based on the first information presented to be less stable (ie. more subject to change) when that information is positive than when negative. When the second block of information is presented we would expect highs to integrate this into the information already attained and alter their impression with each succeeding piece of information (see Asch, 1946). However, as Feldman (1966) shows, we would expect this alteration to be less when the second information is positive than when negative; hence the difference in extremity of ratings found for highs would be expected. In line with this argument we would expect highs to show primacy in the ascending and recency in the descending condition. This was generally found although there were differences over the time variable (see table 4)

suggesting that time may have affected the way in which highs processed information; this will be discussed in a later section.

Lows showed no differences in extremity over order. It will be recalled that the differences in extremity found among highs was attributed to differences in integration strategies associated with different valences. Since lows did not integrate information to as great an extent as highs we would expect any effect of valence upon integration to be small. This being the case, the fact that lows showed no differences over order is not surprising.

As shown in table 2, highs remembered more negative than positive words. This again may point to the influence of negative information on complex subjects in the integration process.

The component ratings measure as discussed in the text gave general support to the hypothesis being presented here. Highs shifted positive words to a much greater extent than negative words regardless of order. This indicates that the modifying capacity notion as advanced by Feldman (1966) drew general support; the negative information when paired with positive retained more of its original normative influence.

Lows also shifted positive words further than negative words in the ascending condition but in the descending condition the negative words were shifted to a greater extent

than the positive. Furthermore, in the descending condition the positive words were shifted away from the negative pole. This indicates that when presented second, negative information had little or no modifying capacity and supports the notion that perhaps lows did not integrate the second information presented them.

One possible criticism against the component rating measure as employed in the present study is that since both normative and in-context ratings were made on the same scale for each word by subjects, subjects may have performed on this task in a way which would make then seem most consistent with their earlier responses. However, since all in-context ratings were made first by all subjects and without knowledge of the normative ratings task to follow, this independence criticism would apply to the later normative ratings only. A correlation done between normative ratings obtained in the present study and those obtained by Anderson (1955) on the same words yielded an r of .97 with a rank ordering of only one reversal. This finding makes the independence criticism somewhat less tenable.

Another possible criticism which may be levied against the component ratings measure is that of interpretation. Anderson (1971) has stated that the positive context effect discussed earlier is no more than a generalized halo effect. The halo interpretation states that when the subject makes an in-context component rating he is responding for each

trait with a composite of the context free value of the trait and the total value of his impression. Anderson goes on to state that the resulting component rating would fit an averaging model of the context free and total impression values. However, as was seen in the present study noncomplex subjects in the descending condition made in-context component ratings for positive valenced traits which were more positive than their normative ratings for those same traits. Because the in-context ratings of traits in this condition moved away from both the normative value of each trait and the normative value of the composite of remaining traits an averaging explanation is not tenable.

In summary, the interpretation of results being offered is that highs did differ from lows in their performance on the task presented in the present experiment. Highs were seen as integrating information and basing their impressions on the resulting structure. Negative information was seen as disproportionally influencing the nature of that structure. Lows were seen as less integrative and being thus affected by the order of presentation of information to a greater extent than highs. As was pointed out earlier, there were differences in evaluations formed by highs as a function of time. This will be discussed now.

Time: There were two hypotheses offered in the present experiment which dealt with the "time" manipulation. The first hypothesis stated that time pressure may induce primacy

and was not supported. Time pressure was manipulated through inter-stimulus interval and as was found earlier by Hendrick et al (1973) this manipulation had no effect on degree of primacy shown by subjects. The present experiment extended this statement to the situation where no set inter-stimulus interval at all was employed.

The second hypothesis involving time stated that lows would be more affected by time pressure than would highs. No support was found for this hypothesis either.

Although the "time" main effect or the complexity by time interaction did not reach significance there was a significant complexity by order by time interaction (see table 4). As was noted earlier the negativity effect alluded to above as an explanatory mechanism for highs' processing strategy did not hold completely across the time variable. In the self paced ascending condition highs showed recency effects or an overall positive evaluation (see table 4). However, it should be noted that no other dependent measures in the multivariate analysis reached significance for the triple order interaction; this leaves the significance of table 4 somewhat questionable. If the time variable were disregarded in table 4 (see marginal means collapsed across the time variable) the evaluations which would be expected if highs were showing a negativity effect are found; also, the other dependent measures mentioned above point to the negativity effect. While the triple order interaction for

primacy seems uninterpretable in light of the other dependent measures it does indicate that more research is needed before the interpretations being offered in the present paper are accepted.

Conclusion: In the study of processing strategies in a serial integration task cognitive complexity seems to be an important variable in enchancing our understanding in this area. Complex people will differ from noncomplex people along a variety of dependent measures in a serial integration task. The nature of this difference seems to be tied to the way subjects structure their impression. Highs will structure impressions more extensively and reflect that structure through their evaluations, lows will not structure as extensively and will be affected more by the order in which information is presented. Finally, evidence was found suggesting that highs will be disproportionately influenced by negative information.

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AN EXAMINATION OF ORDER EFFECTS IN IMPRESSION FORMATION

by

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AN ABSTRACT OF A MASTER'S THESIS

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Eighty-six subjects were presented with a list of six personality traits describing one person in the typical order effects paradigm (Anderson & Barrios, 1961). Subjects were subsequently asked to form an impression of the person described. The amount of time allowed subjects between presentation of each successive trait adjective was experimentally manipulated as was the individual differences variable of cognitive complexity. These manipulations were designed to test the notions that 1) the primacy effect of impression formation usually attained when information is presented in an uninterrupted serial presentation is to some extent an artifact of the time allowed subjects to process information, 2) that complex perceivers would be less effected by order of presentation of information than would noncomplex perceivers, and 3) noncomplex perceivers would be effected to a greater extent by time pressure than would complex perceivers.

In order to better understand how the above manipulations would effect subjects' performance in the impression formation task a number of dependent measures were employed. Each of these measures was designed to reflect different aspects of the processing strategy employed by subjects in forming their impression of the target person. All measures were analyzed in a multivariate analysis design.

It was found that complex perceivers differed from noncomplex perceivers not only in the degree of primacy shown

but also in the structure of the impression written of the target person and the recall of words which were used to describe the target person. These differences were interpreted as reflecting different processing strategies between complex and noncomplex perceivers. Complex perceivers were seen as more integrative in their dealing with the information and as reflecting the nature of this integration through evaluations. Noncomplex perceivers were seen as being more influenced by the order of information than were complex perceivers. It was also suggested that complex perceivers were disproportionately influenced by negative information.

Results indicated that time allowed subjects between words had no general effect on impressions formed.