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THE INTERRUPTION OF TASKS

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Psychologists still know relatively little about the influence of interruption on behavior. Such a statement made baldly in the face of so considerable a literature as has resulted from the early experiments of Zeigarnik (20) and Ovsiankina (11) may meet with some objection. And yet an examination of that literature makes it apparent that certain contradictions and inconsistencies have prevented the construction of any theory having the twin virtues of completeness and simplicity. The present paper will examine some of the seemingly contradictory facts and discuss experimental and theoretical devices for coordinating them.

Zeigarnik gave her subjects simple operations to perform and then interrupted the performance of certain tasks in the series before completion. In an informal recall test, subjects remembered the interrupted tasks better than the completed ones in a ratio of 1.9:1. Control experiments enabled Zeigarnik to discard most of the more obvious explanations of her data, and she arrived at the conclusion that the need (or 'quasi-need') to complete the task as instructed produces, within the person, a tension system which is not ordinarily resolved until the original need is satisfied. When a task is interrupted, the tension persists, producing forces which direct the subject's thought toward the incomplete task.

Ovsiankina attacked the same tensions from another point of vantage. If tension systems within the person correspond to the presence of an intention, and if such systems persist after interruption, the subject's 'quasi-need' to work on the task ought also to persist. Ovsiankina investigated the tendency for subjects to try to resume or continue the tasks on which they had been interrupted. In a thorough investigation of a great many variables, this experimenter was able to show that the trend toward resumption of interrupted tasks is a clear and fairly predictable phenomenon.

The writings of Lewin and his students (*e.g.*, 8, pp. 98-102, 170) have consistently implied that the force which produces resumption and the force which produces enhanced recall arise from the same tension system, and are thus indirect measures of the same thing.

What confusions have developed within this accepted theory? One difficulty concerns the relation between resumption and recall, for some evidence points to the conclusion that they may be expressions of different psychological forces. Another obstacle to clear thinking in this field is the difficulty of distinguishing between the effects of interruption *per se* and the effects of failure; for when a task has been interrupted short of completion, the subject may experience the hindrance as an indication

of personal failure, and when he does, the effects which appear are not easily incorporated into the theoretical scheme originally proposed by Zeigarnik. The literature, moreover, contains apparent contradictions concerning the influence of levels of importance or 'reality' in the interrupted tasks. Difficulties arise in practice when one tries to make experimental use of Zeigarnik's corollary generalizations, particularly as they apply to the influence of later activity. Finally, under particular circumstances, enhanced recall simply does not appear!

1. *Recall and resumption.*—One anomaly that looms very large in the theory of interruption is the experiment reported by Rosenzweig (16, p. 480) in which children who tended to resume interrupted jig-saw puzzles tended to recall the completed ones better than the interrupted ones. The Lewinian theory held, of course, that a subject who has a strong tension system resulting from the interruption of a task may be expected to show two correlated effects: a tendency to resume the task and a tendency to think about it or recall it. But Rosenzweig's subjects show an inverse relation between resumption and recall and consequently cast some doubt on the usual formulation. Rosenzweig's own account of the reactions of his subjects is presented in terms of 'success' and 'failure,' a terminology which further complicates the basic theoretical picture.

2. *Success and failure.*—The distinction between interruptions which are viewed as failures and those which are either neutral or apparently successful is not a new one. Ovsiankina (11) found it necessary to point out that ambitious subjects view the experiments as an opportunity for trying their ability, with the consequence that such subjects will resume those tasks which promise success and avoid those which promise failure. If this is true, the *expectation* of

success or failure is an important variable in the resumption situation, and the determinants of such expectancy will need thorough understanding before we can make successful predictions about the outcome of experiments involving interruption.

Recent researches have not solved the fundamental problem, but they have thrown some light on the nature of the reaction to failure. Rosenzweig, for example, reports the following facts.

(1) Preference for resumption of failed tasks increases with age in children (14).

(2) Adults given jig-saw puzzles as an informal task tended to recall more easily those which were interrupted, while others given the same tasks as 'intelligence tests' recalled completed tasks better. The latter group presumably experienced the interruption on serious tasks as failure and 'repressed' the unpleasant memory (15).

(3) Children whose teachers rate them high on the trait of pride recall successes better than failures, while children rated low on the same score recall more failures than successes (17).

(4) Those children who choose to *resume* failed tasks *recall* their success better than their failures, whereas those who repeat the previously successful tasks remember mostly failures (16).

These results may be fitted into a consistent picture. It would seem that if we hold the situation constant and vary the type of subject (younger vs. older, or those low in pride vs. those high in the same trait) we find two trends. First, the mature and the proud tend to 'repress' the memory of their failures, as a result, presumably, of a strong need for success or for social status. Second, these same subjects, for the same reason, show a tendency to resume those failed tasks in order to satisfy their pride and to remove the previous defeat. If, on the other hand, we hold the type of

subject constant and vary the nature of the situation, we find a trend that dovetails nicely with the personality factor. For tasks which are important to the individual (that is, touch his pride or affect his own view of his social status) are repressed, while those tasks which are unimportant seem to be affected only by the simple interruption-effects originally reported by Zeigarnik. In sum, any threats to the subject's view of himself as a successful individual will produce a tendency to forget those threats, but also to overcome them. The mature subject, or the subject who has sufficient pride will be more sensitive to such threats, and 'important' tasks will be more threatening when failed than will incidental ones.

These conclusions are consistent with those of Cartwright who asked his subjects to rate a series of tasks in order of preference (in place of the usual resumption technique) and who reports: "A fairly sizeable group of subjects raised the preference-rating after failure,¹ thus demonstrating the necessity for a theory of failure which can account for both increases and decreases in attractiveness. Interviews with the subjects seemed to indicate clearly that many subjects who raised their preference-rating viewed the experimenter's evaluation of their performance not as failure, but rather as an obstacle in their way to the goal. . . . Other subjects seemed to want to 'erase' the failure by subsequent success in the same activity (3, pp. 11, 12)." Of this latter group, Cartwright comments in a footnote (3, p. 12), ". . . it is possible that one could speak of a 'need for success.'" In terms of Rosenzweig's formulation, Cartwright's subjects who preferred

tasks on which they had previously failed should be those with strong 'ego-defenses.' They are presumably the mature and the prideful subjects.

Cartwright's final paragraph reveals, however, a further complication. He writes: "In conclusion, there is some indication . . . that anticipation of failure more unequivocally reduces attractiveness than the actual experience of failure. This fact suggests that a person's view of his future is the primarily decisive factor in producing changes in attractiveness (3, p. 13)." If true, this fact necessitates our dealing with different levels of aspiration among our subjects in attempting to predict when resumption will take place and when it will not. One implication, among others, would be the importance of relative difficulty within a task-series, and the studies of Ovsiankina (11) and of Pachauri (12) have shown that this is, indeed, a factor to be reckoned with.

If the whole story had been told, one might construct a satisfactory theory in terms of three variables: (1) personality organization (maturity and pride), (2) the nature of the task situation (importance or triviality with respect to the subject's view of his own status), and (3) difficulty of the task (with its effect on the subject's level of aspiration for the immediate future).

Unfortunately, at least three complications intervene. For practical purposes of prediction and understanding, one grave difficulty stems from the interdependence of the three variables. Level of aspiration, for example, may vary with age, personality, and the nature of the task situation (5). At our present stage of knowledge, this interdependence creates an indeterminacy only to be surmounted by discovering the precise functions which relate the major factors to one another.

A second difficulty inheres in the apparently contradictory nature of some

¹ 'Failure' in these experiments is defined in terms of the experimenter's disparaging comments on the time consumed by the subject. Most subjects *lowered* their preference-ratings for a particular task after 'failing' on it.

of the evidence. J. F. Brown (2) has reported studies in which his subjects carried on two types of task, one an informal set and the other a group of 'intelligence tests.' All tasks were interrupted and the subjects recalled significantly more of the 'intelligence test' tasks than of the informal ones. On the surface, this result contradicts the evidence of Rosenzweig (15). Numerous hypotheses may be invented to account for the discrepancy, but it is difficult to demonstrate the validity of any of them. Were Brown's subjects too immature or unambitious to recognize that failing to complete 'intelligence tests' meant a threat to their status? An unlikely hypothesis. Rosenzweig used separate groups of subjects where Brown used the same individuals, for whom he interspersed intelligence tests and informal tasks. Is it possible that in Brown's experiments tensions produced by interruption of tasks affected neighboring activity within the person, and so account for the discrepancy? We have no direct evidence. Rosenzweig used what was essentially the technique of Zeigarnik (half the tasks interrupted and half completed, and randomly distributed), while Brown interrupted all the tasks on which his subjects worked; here, too, may the degree of neighborhood among tension systems somehow account for the divergent reports? Again it is hard to say anything positive, though some evidence to be presented below may illuminate the last hypothesis to some degree.

One last difficulty with the treatment of success and failure grows out of our present inability to say what constitutes 'failure.' It is legitimate for some purposes simply to define 'failure' arbitrarily in terms of an experimental operation. Such is the procedure of Sears (18), Nowlis (10), Cartwright (3) *et al.*, and it has many advantages. It is patent, however, that such a definition

omits the important dynamic characteristics of failure as an experience, and experimenters in this field will agree that no technique univocally produces a clear reaction of 'failure.' In fact, the reverse is true. All experimenters report deviants whose atypical behavior can be explained only by the assumption (sometimes verified by interview) that the situation produced no experience of failure (v. Cartwright above, p. 331). This very discouraging fact stems, of course, from complexity and will disappear only as we untangle interacting and interdependent components. But it also points a warning finger. If the reactions of different subjects are widely divergent, and if the effects of a particular experimental treatment may be known only from a post-experimental interview, investigators should beware of lumping subjects indiscriminately together for statistical purposes. The averaging of scores resulting from qualitatively different psychological situations may be misleading. The disentanglement of the basic factors may be postponed almost indefinitely unless more attention is paid to the individual case or to group studies in which the groups are chosen on some meaningful psychological basis. Some system must be devised for the conceptualization and measurement of the 'personality' factors that presently beshroud the psychological mechanism of failure.

3. *Homogeneity of interruption.*—Some experiments of the present author have raised still other questions concerning the fundamental dynamics of interruption. In connection with an investigation of relationships between retroactive inhibition and various motivating conditions (13), an attempt was made to compare a series of tasks under tension with a series which was presumably free from such influence. In accordance with a straightforward interpretation of Zeigarnik's hypothesis, an experiment

was designed in which fifteen completed tasks comprised one series (presumably without tension) and fifteen interrupted tasks constituted the other (presumably tense). The results challenge the traditional treatment of these matters, for consecutive interruption of all the tasks in a series appears to rob interruption of its characteristic tendency to produce heightened recall. A series of uniformly interrupted tasks fared no better than a set uniformly completed. This result appeared under conditions of instruction and other experimental factors which should be favorable for the standard Zeigarnik-effect, and which actually gave rise to that effect in control experiments using randomized interruption of one-half the tasks in each series. This discovery was preliminary and incidental to other studies, but if it should be confirmed in more thorough investigations, it will necessitate a re-evaluation of some of the concepts with which Zeigarnik and her followers have dealt.

Three tentative conclusions may be drawn. First, the development of tensions from interruption may be a relational affair determined by the presence of similar systems existing in a completed state. Second, persistent interruption may affect the attitude of the subject toward the entire experimental situation, in which case the results reported variously by Zeigarnik, Ovsiankina, Fajans (4), and Marrow (9) would lead us to expect observable changes in behavior. Third, the difference between the experiments of Rosenzweig and those of J. F. Brown, discussed above, may reside largely in the fact that Rosenzweig's technique compares systems under tension, while Brown is, perhaps, considering two systems that are not so affected, since all his tasks are interrupted.

4. *Retroactive inhibition of Zeigarnik's effect.*—One other finding deserves comment. Zeigarnik, in her original in-

vestigation, found certain cases in which the high ratio between the recall of interrupted tasks and the recall of completed ones was reduced by activities which followed the usual experimental procedure. When subjects were summoned to the telephone for an important call, only to discover that they had been tricked, the recall test failed to show the normal advantage for interrupted tasks. Similar results, varying in their effectiveness, were found when the subjects were sent to another room to participate in a different sort of experiment, or when they were engaged in a conversation about their own pressing problems. Such deviations from the basic technique were said by Zeigarnik to produce a change in the *Umfeld*, the surrounding conditions by which the tensions were determined, and consequently to dissipate the tensions. Conversation with subjects who continued to recall more interrupted than completed tasks despite the change revealed that they had considered the new situation only an interlude and that recall for them was easy. These subjects were said to be psychologically still 'in' the original task-situation.

In the course of the preliminary experiments described above, the present author studied the relationship between recall for interrupted tasks and recall for completed tasks in the standard retroactive inhibition set-up. Two groups of subjects were used. Group 1 worked on a series of sixteen tasks, half of which were interrupted and half completed. A five minute intermission followed, after which the subjects were told that the experiment would continue, and a second series of tasks (this time only eight, all completed) was presented. At the end of the eighth task, recall for the first set of tasks was tested. Group 2 followed exactly the same procedure except that no second series was given, and these subjects merely read an interesting book

for the period during which Group 1 worked on the second set of tasks.

In terms of Zeigarnik's hypothesis, it might be expected that the second group would experience the less continuity between the first and second parts of the experiment, since the work on another series of tasks was treated as a simple continuation of the original experiment and was apparently so accepted by the subjects. While it is possible that a similar attitude was present among the group with no interpolated series, any existing differences should, according to Zeigarnik's formulation, presumably be in the direction of maintaining the tension in those subjects who had the less psychological change between the two parts of the experiment. The reverse appears to be true. Table I gives the

TABLE I

	Mean I/C *
Group 1 ($N = 10$)904
Group 2 ($N = 10$)	1.396
	Diff. .492
	$F = 7.86$
	($P = .05$ when $F = 4.41$; $P = .01$ when $F = 8.28$)

* The fraction I/C is the ratio between the recall of interrupted tasks (I) and the recall of completed ones (C).

results for tasks recalled during the first three minutes. The magnitude of the difference when subjects were allowed indefinite time for recall was somewhat smaller, but the significance of that difference was nearly as high ($F = 7.0$).

Three hypotheses present themselves. In the first place, it may be true that any kind of activity tends to destroy 'tensions' more quickly when it is intense than when it is relatively mild. Such an effect, if it can be demonstrated, might account for at least some of the phenomena of retroactive inhibition. In the second place, the influence of similarity cannot be ignored. We know from many investigations that increased

similarity between original and interpolated learning increases retroactive inhibition. It may be true that similarity also determines the degree to which tension systems may interact in such a way as to dissipate each other. One may even conceive that such a mechanism lies at the root of the classical retroactive inhibition phenomenon, if he assumes first that some sort of tension is always necessary for recall.² In the third place, the effect here demonstrated may arise from the tendency for completed tasks in the second series to serve as substitutes for the interrupted ones in the first set. Thus the original tension may have been released by success on later tasks. If the last explanation is the correct one, we need deal with no new concept, since the problem of substitution has received considerable attention. On the other hand, the data under consideration would necessitate a careful reëxamination of the criteria for substitute value. For nothing in the nature of Series 2 implies greater equivalence (and consequent resolution of tension) for its members than for the completed tasks within Series I itself. It seems difficult, in other words, to reconcile the two facts appearing in this study: (1) that some completed tasks are necessary before interruption becomes effective, and (2) that the addition of a few more completed tasks will begin to obliterate those effects. We may not, however, dismiss this possibility without further investigation, and psychological theory is now ready to profit by quantitative studies showing how differential recall changes with different proportions of completed and interrupted tasks.

5. *Discussion.*—Two principal weaknesses in our knowledge about the ef-

² For fuller consideration of this possibility, see Appendix D in W. C. H. Prentice, *The effect of intent and interruption on retroactive inhibition*, Ph.D. Thesis, Harvard Univ. Lib.

facts of interruption emerge from the present survey. The first has to do with the conceptualization and representation of the variables involved, and the second concerns the inadequacy of experimental methods.

The life space.—With respect to the former problem, it would seem that mere manipulations of the concept of tension are unable, without other considerations, to account for the complexity of the phenomena. It is quite possible, however, to use Lewin's conceptual framework in describing these facts, so long as we do not confine ourselves too strictly to the events in the 'inner personal regions.' In fact, the studies of Fajans (4) and of Marrow (9) have already pointed the way to a relatively simple solution.

Fajans has shown that differential reactions to failure may sometimes be explained in terms of changes in the subject's perception of the total situation, by changes, that is, in what Lewin has called 'cognitive structure.' This sort of change may take place, for example, when the experience of failure leads the subject to see certain reactions as obstacles rather than as the pathways to his goal they had previously seemed.

Marrow, in a careful and ingenious experiment, reversed the Zeigarnik-procedure. He instructed his subjects in such a way that interruption signified 'success' on the tasks, since they were to be allowed to continue only so long as the experimenter was not sure the method had been grasped. Under Marrow's conditions, the subjects recalled more completed than interrupted tasks. Thus one sees that tensions are not necessarily specific to particular tasks, but may concern instead the whole experimental situation, wherein the goal is probably something very general like 'pleasing the experimenter,' 'proving one's ability' or the like. In Marrow's cases, interruption was a sign of

achievement and actually had the effect of *resolving* the tensions set up by the original intention or 'quasi-need.'

Probably all, or nearly all, of the experiments on interruption have involved a situation essentially like Marrow's, the true goal being more general than the completion of a simple task. Typically, the goal is one of pleasing the experimenter, though special instructions may introduce further complications, and the task simply provides the distinguished path to that goal. The force in the direction of completing the task is really a resultant force and need not imply any positive valence of the task itself.³

Of the several effects that interruption may have on cognitive structure, two are concerned with changes in the degree to which one path is distinguished from others. Unfortunately, neither Lewin (8) nor Leeper (7) deals adequately with the factors that determine which path will be the distinguished one. Lewin, in his preoccupation with motivational problems, defines the distinguished path in terms of maximum valences among the various means to a goal. It should be clear, however, that in many cases the choice of a particular path is largely a perceptual matter. Leeper has apparently grasped this fact, for he uses a perceptual example in at least one case (7, p 161), but the relationship is nowhere formalized. In the typical interruption-situation, the means to the goal will have its attractiveness determined by, among other things, the *apparent* degree of difficulty involved, and we must at some point concern ourselves with the dynamics of these appearances. The crucial need at the

³ In some cases, of course, the task will possess a positive valence, *i.e.* will be intrinsically attractive. In such instances, 'interruption-tensions' may be expected to appear despite the absence of the conditions described in the following paragraphs.

moment, however, is to recognize that, in experiments of the Zeigarnik type, the task must be viewed as a path to a larger goal, that the task may change its path-character, and that any changes must result from identifiable factors in the total situation.

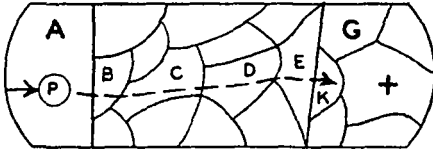


FIG. 1 $f^*_{A,G}$ in $w_{B,C,\dots,K}$ where K is a sub-region of the goal G . K stands for the solution or completion of the task, while the intermediate regions represent stages of activity in working on the task.⁴

Let Fig. 1 be taken to represent the psychological situation at the beginning of any particular task in an experiment on interruption. The various regions represent stages in the task's solution. It should then be clear, for example, that an interruption that takes place just before success would have been assured may make it clearer than ever to the subject that just this path is the proper one for him to follow, or, in other words, may make the path more clearly 'distinguished' (Fig. 2). When

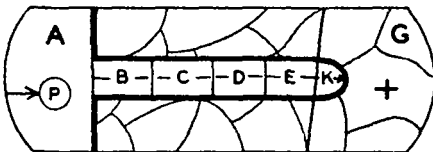


FIG. 2. The same resultant force shown in Fig. 1 will be stronger here since the more clearly distinguished path will lead to a diminution of the strength of forces along competing paths. The form of this diagram has been chosen as a means of representing a more stable cognitive structure.

⁴ $f^*_{A,G}$ = force in region A toward region G . f^* = resultant force. $w_{B,C}$ = path (from German *Weg*) from region B to region C . $+$ = a positive valence or attraction to the region representing a particular act. $-$ = a negative valence or repulsion.

it is not possible for the subject to be sure of his ability to follow the path to its end, however, he may come to see the formerly distinguished path as a cul-de-sac, with the result that the continued presence of his general need to please the experimenter will nevertheless be insufficient to direct him toward resumption of the specific task on which he was interrupted, but may, on the other hand, lead him to seek actively for another path to the same goal. In such cases, the former path may be described as less well distinguished, and the resultant force along its direction may show a consequent decrease in strength. Such a situation is represented in Fig. 3 and

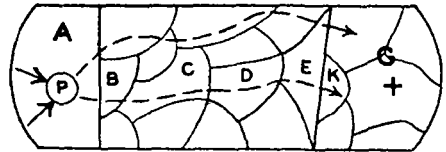


FIG. 3. Two resultant forces toward the general goal may be nearly equal as a result of relatively unclear structure. The path representing work on assigned tasks ($w_{B,C,\dots,K}$) may have strong competition.

might be verbalized by the subject somewhat as follows: "I thought that was the way to satisfy the instruction, but now I am not so sure; maybe there is a better way."

Other changes may take place in the cognitive structure. When the attempt to complete a task has led to unpleasantness and feelings of insecurity, that activity may take on a negative valence (Fig. 4) or may (more likely) take on

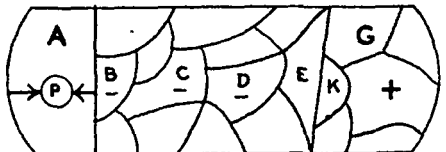


FIG. 4. Some or all of the part regions of a particular path may acquire a negative valence with the consequence that $f^*_{A,G}$ may, in the absence of any alternative path, be opposed by strong forces.

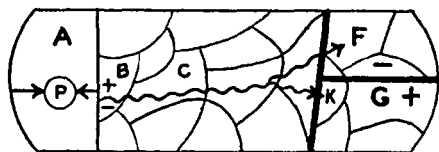


FIG. 5. The structure represented here is that of a subject who views $w_{B,C,\dots,K}$ as bifurcated and as having two possible ends, the choice being out of the subject's control. The region corresponding to the first step of the task has, consequently, both a positive and a negative valence. (The wavy arrow shaft indicates the inability to retrace one's path, v. Leeper, 7.)

the character of a bifurcated pathway which could lead to success, but might lead also to failure (Fig. 5). In either case, the resultant force in the direction of resumption of that particular task would be weakened. This state of affairs may characterize the children in Rosenzweig's experiments who tend to resume those tasks on which they have 'succeeded.' It may also account in part for the conditions under which 'repression' takes place, though the latter is certainly more complicated. In the case of other subjects, however, failure may be experienced (for reasons which we cannot now specify) as diffusing the region in which the person finds himself, so that it is the immediate situation in which he feels insecure as a result of not having reached his goal. Thus the present state acquires a negative valence, and the force away from that state is enhanced (Fig. 6). Such a situation may be representative of the subjects in several experiments who show a 'need for success.' What Rosenzweig calls

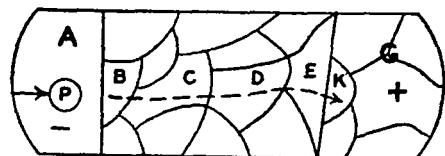


FIG. 6. Region A has acquired a negative valence, and the resultant force in the direction of G along $w_{B,C,\dots,K}$ is thereby enhanced in strength.

'strong ego-defenses' may, moreover, be correlated with a tendency toward this diffusion of the effects of failure.

Finally, a long series of interruptions may lead the subject to see his path as considerably shortened. He may, that is, so 'restructure' the situation that he perceives the tasks as ones which he is not expected to complete and upon the completion of which his ability to please the experimenter does not depend. He might thus conclude that his goal could be reached merely by attempting the task, and interruption would leave no tension (Fig. 7). Evidence reported

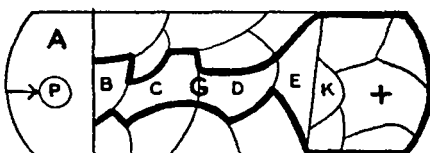


FIG. 7. In this drawing, all the sub-regions of $w_{B,C,\dots,K}$ have become incorporated in the goal region, with the consequence that activity corresponding to any of them is equivalent to reaching the goal. A similar situation might exist with respect only to some of the stages of the performance of a task, but the principle would be the same. In either case, some degree of activity short of completion would resolve the tensions arising from the original instruction.

above indicates that something of the sort may take place when series of tasks are homogeneously interrupted. Superficial observation of the subjects' behavior seemed to show a marked lessening of tension in many cases after several interruptions, a change that may arise from the kind of restructuring shown in Fig. 7.

Some issues remain. The apparent reduction of tension by later activity (even of the same sort) does not lend itself to easy conceptualization. Further research will certainly be necessary before we can identify the effective differentiae between the conditions of Zeigarnik and those in the experiment of the writer reported above. More trou-

blesome still is the question of whether the forces toward recall and those toward resumption may be different. One may suggest tentatively that the tendencies to act and to remember take place at different levels of the life space, and the problems of 'repression' may also have to be dealt with in this fashion. It is, however, too soon to say whether such representation can be consistent and useful.

With the exception of such cases, it is apparently possible, by using these conceptualizations individually or in some combination, to represent adequately the life space of a subject whose attitude toward the situation is known *post facto*, and many otherwise confusing phenomena are considerably clarified by their use. But there is a fundamental fault in our method which still prevents truly satisfactory treatment of the complex issues involved in the psychology of interruption. We have not yet established the relations between experimental variables and our conceptual diagrams.

The relation of objective variables to the life space.—How is it possible to predict in advance which of the various diagrammatic representations will actually apply to a particular subject or to a particular experimental arrangement? What, in fact, are the experimental variables known to affect the response to interruption? In tabular form, they may be ordered as follows:

Factor	Investigator
Structure of the task	Zeigarnik, Ovisiankina
Age of subject	Zeigarnik, Fajans, Rosenzweig
Fatigue	Zeigarnik, Pachauri
Time spent on tasks	Pachauri, Prentice ⁵
Difficulty of tasks	Ovsiankina, Pachauri
'Personality' of subject	Ovsiankina, Rosenzweig
'Importance' of task	Brown, Rosenzweig
Success vs. failure	Rosenzweig, Nowlis, Cartwright
Attitude of subject	Zeigarnik, Ovsiankina, Marrow
Nature of post-experimental activity	Zeigarnik, Prentice
Homogeneity of interruption	Prentice

⁵ Dissertation cited above.

A mere glance at this tabulation is sufficient to remove any wonder at the fact that many investigators (see especially Boguslavsky and Guthrie, 1) have been unable to reproduce 'the Zeigarnik effect.' Wonder should be reserved, on the contrary, for the fact that so little effort has been expended in constructing a uniform and thoroughgoing theory of the processes involved.

It must be apparent that there is something fundamentally wrong with our approach to these issues. All our effort has been directed toward a conceptualization of the psychological variables that intervene between the objectively controllable situation and the subject's reaction; practically no effort has been used in trying to establish the relations between the objective situation and the intervening variables.

In a recent paper, Spence (19) has made essentially the same point in criticism of the Lewinian position. Spence, however, errs in his failure to recognize the importance of the phenomenological method in understanding the nature of the intervening variables. His position is an evidence of the latent dualism which is seemingly ineradicable from the stimulus-response psychologies. The behavioristic viewpoint and tradition apparently creates a blind-spot for the perfectly obvious fact that phenomena, after all, *are* intervening variables. Only an implicit acceptance of the notion that experiences are of a certain

'mind stuff' incapable of operating in a materialistic world, or that they are, at best, a sort of epiphenomenon, can account for Spence's rejection of phenomena from the realm of scientific data. The only serious troubles with phenomena are (1) that we may get only crude approximations from the subject and (2) that they do not exhaust the stock of intervening variables.

On the other hand, Spence, like Hull (6), correctly and forcefully insists that the nature of theoretical constructs in psychology demands the establishment of functional relations of two sorts, those relating manipulable variables to constructed intervening variables, and those relating the latter to measurable reactions. It is the former task which has been neglected in dealing with the problems of interruption. While a good case may be made for the order of procedure that has been followed to date, the time has now arrived when we need careful investigations of the functional interrelations among the experimental variables and of their relations to constructs like 'distinguished path' and 'valence.' Any such program will necessitate quantification of measures which have been so far only crudely rated with respect to strength. The difficulties involved in finding mathematical units expressing degrees of fatigue, of task-difficulty, of the subject's attitude toward the experimenter, and the like are truly staggering ones. It is such difficulties that have undoubtedly been responsible for two noteworthy phenomena of current psychological theory: first, the fact that the workers who insist on quantification uniformly work with peripheral and segmental problems (and usually with animals) and second, that psychologists who are impatient with our ignorance of central problems have consistently ignored the vital step involving connections between manipulable variables and the intervening constructs.

But the issue cannot be postponed indefinitely.

6. *Summary and conclusions.*—Without any attempt at an exhaustive survey of the literature on the subject of interruption, it has been possible to show that certain confusions and contradictions have arisen since Zeigarnik's original contribution was published and that theoretical treatments have failed to keep pace with the evidence.

Two types of remedy have been proposed. (1) More attention should be given to the *cognitive* changes involved in many of the experiments, since treatment in terms of motivational variables alone has proved inadequate. Some specific examples of the types of cognitive restructuring that occur have been presented. (2) The need is crucial for studies that explore the relations between objective variables and the intervening variables represented by Lewin's life space. Many of the studies will be extraordinarily complex as a result of the large number of factors demonstrably involved, and such studies must consequently be rather precisely quantified. Until both these remedies have been adopted, the 'explanations' of the findings of Zeigarnik, Ovsiankina, Rosenzweig, Marrow and their various followers will remain speculative and scientifically unsatisfactory.

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