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Remembering intention as a distinct form of memory

Lia Kvavilashvili

This paper deals with a little explored phenomenon – remembering and forgetting intentions. Unlike the usual forms of memory, such as remembering and recalling particular contents and images acquired in the past, it refers to the timely execution of a formerly intended action. In order to test whether these two forms of memory depend on each other or not, an experimental method has been elaborated which makes it possible to avoid the artificiality of experimental instruction and to register simultaneously both remembering intention and remembering a particular content connected with this intention. The lack of correlation between these two variables in Expt 1 indicates that they may be presumably considered as two separate forms of memory. In Expt 2, the role of such factors affecting remembering intention as the importance of intention and the character of the intervening period has been established. The application of multidimensional information analysis showed that there ought to be a certain interaction between these factors. The role of perseveration (i.e. involuntary rehearsal of intention in mind) has also been ascertained. In relation to this, it was found that the importance of intention directly affects remembering intention while the character of the intervening period affects it only indirectly via perseveration.

A friend telephones you and asks you to give your spouse a message. You agree to do so. You have now committed yourself not just to one but to two memory tasks: you must not only remember the content of the message, but you must also remember to deliver it. And it is this last thing that you very often fail to remember, not the former (Harris, 1984).

Remembering various sorts of information – in the present example, the content of the message – has been studied in great depth since Ebbinghaus, but remembering intention, i.e. remembering at the appropriate time that one had decided to carry out a particular action at some point in the future, has received relatively little attention. Indeed, Meacham (1982) has noted that 'remembering is an essential operation in the execution of planned actions, but there has been very little research and discussion of remembering in this context, with far fewer than a dozen studies currently available' (p. 123). Perhaps this is why Baddeley & Wilkins (1984) termed the literature currently available on remembering intention as embryonic.

If the history of research on remembering intention is studied in detail, it will be agreed that Freud (1901) was presumably the first psychologist who considered explicitly the instances of forgetting intention in everyday life, but he assumed it was subject to the same process of repression that he attributed to other memory phenomena. Lewin (1926/1951), on the other hand, commented that 'a good memory, ability to reproduce knowledge and actions, need not be accompanied by the virtue of not being forgetful in carrying out intention' (p. 106). Following the pioneering experimental work of Lewin's student, Birenbaum (1930), however, no further work on remembering intention appeared, as far as the author has been able to determine, until a small number of experimental studies (Meacham & Leiman, 1975; Meacham & Singer, 1977; Wilkins & Baddeley, 1978; Meacham & Colombo, 1980; Harris & Wilkins, 1982) and also questionnaire studies (Harris, 1978; Herrman & Neisser, 1978; Bennett-Levy & Powell, 1980; Meacham & Kushner, 1980) began to appear in the mid-1970s. This long period of inactivity undoubtedly occurred in part because both European and American psychologists were preoccupied with other theoretical interests, but two additional factors may also have contributed. First, it may have been assumed by many researchers that remembering

intention is theoretically indistinguishable from usual forms of memory, such as remembering and recalling various sorts of information (contents) acquired in the past (Loftus, 1971). In this case there would be no particular reason to focus explicitly on intentions as a research domain. Second, remembering intention is not readily amenable to investigation by the methods commonly used in memory laboratories; simply allowing the subject to know what phenomenon is being studied may so compromise ecological validity as to render results uninterpretable.

In the first of the recent experimental studies mentioned above, Meacham & Leiman (1975) sought to examine remembering intention in a naturalistic setting and, thus, at least partly, to overcome the limitations of traditional laboratory methods. To examine the effect of retrieval cues upon remembering intention (their term was 'prospective remembering') they employed a task in which subjects had to remember to mail postcards to the experimenter on appropriate dates over one month, and a design in which reminder tags were attached to the key chains of the treatment group. If the subject sent the postcard late (e.g. the next day), then his or her result was registered as forgetting intention. Confirming the intuitions of even schoolchildren (Kreutzer *et al.*, 1982), they found that their retrieval cues did indeed facilitate performance in this task, especially when the actions to be remembered did not follow one another closely. Apart from this, the subjects were also administered a free recall test to measure the productivity of remembering contents ('retrospective remembering' in their terminology). But Meacham & Leiman reported in only one sentence, as if in an aside, that they found no relationship between prospective and retrospective remembering. However, it is unclear from their account which scores of these two forms of remembering were used in calculating the correlation, and which coefficient of correlation was used.

A second experimental study (Wilkins & Baddeley, 1978) also employed a more or less naturalistic setting, and explored the relationship between remembering intention and remembering content. Wilkins & Baddeley had subjects carry miniature print-out clocks (plastic boxes) with them and activate them (push the button) at four particular times each day for a week. The number of minutes they were tardy in activating the clock was taken as an inverse index of performance of remembering intention. These subjects also participated in a conventional free-recall test, and it turned out that subjects with high free-recall scores responded less accurately at the pre-arranged times than those with lower scores. As a matter of fact, this result suggests that there ought to be a negative correlation between remembering intention and remembering contents, which for some reason was not calculated by the authors. Wilkins & Baddeley suggested that subjects who earned high scores on the free-recall test may have been better educated, have had wider interests and more varied life-styles, than the remaining subjects and may, therefore, have been more readily distracted from the clock-recording task.

Although the two latter studies did seek to explore remembering intention in a more or less natural setting, they actually seem to have combined the main disadvantages of both naturalistic and laboratory research on this topic. Because the experimenters had no control over the subjects' activities during the intervening period, they were not able to prevent subjects from using unplanned retrieval cues, or from exposing themselves to unplanned distractions. What is more, they could not even be sure that a subject's failure to respond on time meant a failure to remember; a number of non-memory factors, motivational and contingent, might have prevented a subject from mailing a postcard or activating a clock in time.

Moreover, subjects in both of the studies knew that remembering intention was the topic under investigation, and they may have modified their behaviour accordingly. For example, Wilkins & Baddeley's (1978) negative relationship between prospective and retrospective

remembering might have arisen because subjects who knew that their memories were generally poor took special pains to overcome their memory limitations during the clock-recording study.

It thus appears that the 'discriminant validity' of the construct, remembering intention, remains to be established; its establishment would appear to be a prerequisite for further experimental investigations of this domain. Accordingly, Expt 1 sought to examine the relationship between remembering content and remembering intention, and Expt 2 to examine the factors that might substantially affect the latter. But in order to investigate remembering intention there must be a possibility (*a*) of controlling the subjects' behaviour throughout the intervening period while withholding from them the knowledge of which phenomenon is actually being studied; (*b*) of having the subjects carry out intentions which naturally occur in everyday life. This may be achieved only if the intention to be remembered is carried out according to the experimenter's personal request, i.e. remembering intention must not be a necessary part of experimental instruction.

The experiments described below were carried out bearing in mind these requirements.

Experiment 1

This experiment was concerned with the establishment of a correlation between remembering contents and remembering intention. But in so far as it is not clear whether the latter represents a stable personality trait, then, in checking the hypothesis of the non-existence of correlation between these two forms of memory, one should not have to follow the way chosen by Wilkins & Baddeley (1978) or Meacham & Leiman (1975) who carried out two separate experiments on the same subjects. They first administered a free-recall test to their subjects, i.e. they measured the productivity of remembering contents (words) which was absolutely unrelated to the intention (pushing a button or mailing a postcard). The efficiency of execution of the intention was measured in the second experiment. The point is that, if remembering intention is not a stable personality trait, i.e. if it does not even correlate with itself, then the discovery of the fact that it does not correlate with the scores of the free-recall test (see Meacham & Leiman, 1975), or generally with the productivity of remembering various contents, would not prove that these two types of memory do not depend on each other and have nothing in common.

In order to check this last hypothesis, an experiment ought to be carried out, in which it would be possible to register simultaneously, in only one test, both variables: remembering intention and remembering contents connected with this intention.

Method

Procedure. The experimenter gave the subject the following instruction: 'Our experiment is rather complex since we shall first carry out an experiment here in this lab, and then you are to go to a lab next door where another experimenter is already waiting for you in order to carry out the second experiment. Finally, you have to return here so one more experiment can be carried out. All these experiments consist of short tests so too much of your time won't be taken up.' After these instructions two simple tests were administered to the subject which had nothing to do with the main purpose of the experiment. One of them was a modified version of Sternberg's scanning paradigm while the other was Bourdon's test of attention, which requires subjects to cross out a certain letter (or letters) from lines of randomly set alphabet letters as quickly as possible. When these tasks were accomplished, the experimenter asked the subject to go to the next laboratory and once again reminded the subject that afterwards he or she had to return. After the subject had got up and was walking towards the door, the experimenter stopped the subject with the following request: 'I am sorry but I think there is some mistake here (and refers to the records of the experiment). If you don't mind, could you ask the second experimenter what data were obtained yesterday by Kandibadze?' In this experiment the content of the information to be delivered was precisely this Georgian surname, which had been specially made up to be equally unfamiliar to all subjects.

Table 1. Subjects' performance with regards to remembering/forgetting intention and content (no. of subjects)

	Remembering content (retaining the surname in memory)	Forgetting content (not retaining the surname in memory)	Total
Remembering intention (reminding about the request at an appropriate moment)	12	32	44
Forgetting intention (forgetting to remind about the request at an appropriate moment)	5	31	36
Total	17	63	80

There was an attempt to make the situation entirely natural so that the experimenter's request should not seem strange to the subject. Therefore the experimenter had the fictitious records and diagram opened before her on the table. While the subject was performing Bourdon's test the experimenter was turning over these fictitious records trying to give the impression that she was busy filling in the diagram with the results of some calculations she had made. When after the experiments some subjects were asked a few questions about the procedure of these experiments, they said that the experimenter's request seemed quite natural to them since she was presumably analysing data obtained in the previous experiments. In their opinion, this request was entirely unrelated to the main purpose of the experiment.

As soon as the subject entered the laboratory next door he or she immediately delivered the message to the second experimenter, who looked through the records for a few seconds pretending that she was really trying to find Kandibadze's data but could not. She then turned to the subject and said: 'Evidently the data of this subject are not in these records. It would be better if we immediately carry out the experiment so that the interval between our experiment and the previous one isn't too long. After we have finished please remind me about it and then I will try to find the data.' After this, in order to check the subject's memory for contents, the experimenter administered two tests which had no direct connection with the real aim of the experiment. The total length of time spent on them did not exceed eight minutes. When these tests were over the experimenter told the subject that he/she had finished and asked him/her to return to the first laboratory.

This was the 'critical' moment of the experiment, i.e. the moment when the subject's behaviour was examined with special attention. Four outcomes were possible (see Table 1):

(1) If the subject at this 'critical' moment reminded the experimenter about the request for data and was also able to reproduce the surname, then the experimenter would open the bookcase, take the fictitious records and 'find' Kandibadze's data, and write them down on a piece of paper which the subject would convey to the first experimenter.

(2) If the subject reminded the experimenter about the request but could not retrieve the surname, then the experimenter would tell the subject that after the experiment she would see the second experimenter herself.

(3) If the subject left the room without executing intention, i.e. without reminding the experimenter about the request, then the experimenter would call the subject back and remind him or her of it. In those cases where the subject was able to elicit the surname from memory, the experimenter would act as in (1) above.

(4) However, if the subject was not even able to retrieve the surname without a mistake, then the experimenter would behave in the same way as in (2).

When the subject returned to the first laboratory, the first experimenter carried out two final tests which again had nothing to do with the real aim of the experiment. In fact, all these tests were administered in order to assure the subjects that the main purpose of this investigation was to study their various cognitive abilities and functions, such as attention, memory and thinking.

Subjects. The volunteer subjects were 80 students (40 male and 40 female) in various departments of Tbilisi State University, aged from 17 to 27 years. All subjects were unaware of the real purpose of the experiment.

It should be noted that in this experiment conditions for all subjects were approximately equivalent throughout the intervening period. While participating in the experiment of the second experimenter, all the subjects had to perform the same tasks. In addition, any divergence between remembering intention and its factual execution was also totally ruled out.

Finally, one more point deserves special attention. Though the experiment was conducted in laboratories, the subjects were not required to remember the intention by somewhat artificial instruction, as was the case in the experiments of Meacham & Leiman (1975) and Wilkins & Baddeley (1978) described above. Despite the fact that the experimenter herself still asked the subject to carry out a certain intention, she no longer played the role of an experimenter with regard to the subject while asking it. Indeed, the subject's intention was not part of the experimental instructions but rather of the experimenter's personal request, which in the subject's opinion had nothing to do with the main purpose of the ongoing experiment. The insertion of this new, unexpected (informal) aspect into the experiment enables investigation of remembering intention as it usually occurs in everyday life.

Results and discussion

The results obtained are given in Table 1 in the form of a bivariate frequency distribution. On the basis of this distribution the correlation coefficient φ was calculated. It equalled 0·16, which does not significantly differ from zero ($\chi^2 = 1{\cdot}39$, d.f. $= 1$, $P > 0{\cdot}2$, with Yates's correction applied).

This result indicates that, even if content of an intention is retained in memory, this does not in the least mean that the probability of remembering this content at the appropriate moment is increased. It appears that the retention of intention content itself is by no means such an active 'force' that it can prompt a person to carry out an intention at an appropriate time.

Experiment 2

The purpose of Expt 2 was to study the factors substantially affecting the process of remembering intention. Of course, these factors may turn out to be entirely different variables such as age (Meacham & Colombo, 1980), sex (Meacham & Leiman, 1975), date or the time of day when the intention is to be carried out (Meacham & Leiman, 1975; Wilkins & Baddeley, 1978), various retrieval cues (Loftus, 1971; Meacham & Leiman, 1975) and so on. But the two principal factors to which the whole diversity of factors may be reduced appear to be the importance of intention and the character of the intervening period, i.e. the interval of time between the act of intending up to the execution of intended action.

It may be suggested that the more important an intention is, the greater the probability of remembering it at an appropriate moment. The experimental study of this question is all the more necessary in order to ascertain the inner mechanism of its operation. In particular, it should be clarified how increasing importance of intention affects the probability of remembering: directly or indirectly via perseverations,* which are likely to occur throughout the intervening period.

Is it the case that the more important the intention, the more often perseverations will

* In psychological literature perseveration is usually referred to as a cyclical or persistent repetition of sensory, motor or linguistic forms of activity. But in the context of this work the term perseveration is used to indicate the involuntary imagination of a future action (its involuntary appearance in the subject's consciousness) which may occur once or even several times during the intervening period. This term is used by Woodworth (1938) in the third chapter of his *Experimental Psychology* almost in the analogous sense.

appear which in their own turn will promote the remembering of intention? It is rather surprising that in the above-mentioned works, and others which are currently available in this area of research, the question of the role of perseveration in remembering intention is almost never raised.

As for the second factor, the character of the intervening period, this should also play a certain role in remembering intention. Namely, the probability of remembering intention may vary considerably according to the activity a person is engaged in during the intervening period, i.e. whether he is entirely absorbed in an interesting activity or, on the contrary, is engaged in dull, repetitive work or is doing nothing in particular. It should be noted that, even if the role of this second factor in remembering intention is ascertained, there still remains the question of its inner mechanism. In particular, does the character of the intervening period considerably affect the probability of remembering intention by itself, or is its influence mediated by perseverations? In the latter case one could presume that, if the intervening period is filled with an uninteresting activity, then it would promote the appearance of perseverations and, if it is filled with an interesting one, then presumably there would be no opportunity for perseverations to occur. As for the perseverations themselves, it is suggested they should promote the remembering of intention at an appropriate moment in almost every case.

Method

In the present experiment the first factor (the first independent variable), importance of intention, had two levels (values): (1) unimportant and (2) important intention. The second factor (the second independent variable), character of intervening period, had three levels (values): (1) an intervening period not filled with any activity; (2) filled with an uninteresting activity; and (3) filled with an interesting activity. The duration of this period was five minutes in all cases.

Inasmuch as the combination of the levels of these independent variables (factors) yields six possible variants, the experiment was carried out according to the design in Table 2.

Subjects. According to the design given in Table 2 a total of 300 volunteer subjects (all of them students in various departments of Tbilisi State University: 126 male and 174 female, aged 16–28) were randomly assigned to one of six groups. There were 50 subjects in each group. All subjects were unaware of the real purpose of the experiment.

Procedure. Variants 1 and 4 (unfilled intervening periods). After measuring the subject's reaction time the experimenter told him or her that they should go to the lab next door to continue the experiment. After doing so, the experimenter gave the subject the following instruction: 'This experiment aims to study the effect of an activity, requiring intensive attention, on reaction time. Therefore, one group of subjects will perform here in this lab a certain task lasting five minutes and calling for intensive attention. But as you happen to be in the control group you have simply got to sit still, try to relax and do nothing during these five minutes. You will be left alone in this room lest you should feel constrained. I shall be waiting for you in the first lab. When the five minutes are over you must immediately return to the first room so we can measure your reaction time once again.'

Just as the experimenter finished talking, the telephone unexpectedly rang. The experimenter answered the call but was cut off immediately. Since the telephone (which was out of the subject's sight) played the role of an unforeseen factor, interrupting the normal course of the experiment, the experimenter, looking concerned, turned to the subject with the following request:

Variant 1 (unimportant intention) – 'I will leave the receiver off the hook so that it doesn't annoy you. But when these five minutes are up will you be so kind as to hang it up?'

Variant 4 (important intention) – 'I will leave the receiver off the hook but when these five minutes are up be sure to hang it up, because the head of department is waiting for a call from a foreign professor from Moskow. So you won't forget, will you?'

After this request the experimenter set an hour-glass timer before the subject and left the room. When the subject returned to the first lab after five minutes the reaction time was measured for the second time. Finally, the subject was asked several questions in order to clarify whether he or she had

Table 2. Distribution of subjects' performance with regard to the levels of two independent factors: The importance of intention and the character of intervening period

Intervening period	Remembering	Forgetting	Total
Unimportant intention			
1. Unfilled			
With perseveration	15	1	16
Without perseveration	12	22	34
Total	**27**	23	50
2. Filled with uninteresting activity			
With perseveration	7	2	9
Without perseveration	14	27	41
Total	**21**	29	50
3. Filled with interesting activity			
With perseveration	1	1	2
Without perseveration	11	37	48
Total	**12**	38	50
Important intention			
4. Unfilled			
With perseveration	26	0	26
Without perseveration	22	2	24
Total	**48**	2	50
5. Filled with uninteresting activity			
With perseveration	11	0	11
Without perseveration	28	11	39
Total	**39**	11	50
6. Filled with interesting activity			
With perseveration	6	0	6
Without perseveration	37	7	44
Total	**43**	7	50

had perseveration or not, i.e. whether the subject had remembered the experimenter's request during the intervening period. These questions were put in such a way that the subject would not have been able to guess the real purpose of the experiment, that of registering remembering or forgetting an intention which the subject had decided to perform. It was important since the experiment could have been thwarted if the subject's classmates knew the real reason for it. This was achieved in the following way. The experimenter informed the subject about the possibility of interference by various unforeseen objective as well as subjective factors, explaining that it was necessary to record in as much detail as possible all the factors occurring by chance during the experiment. Therefore, the subject first had to ennumerate all the objective factors, if any, which might have taken place during his or her presence in the second room. Then the experimenter pointed out that, while the subject was relaxing or performing an experimental task (the latter was told to groups 2, 3, 5 and 6) some subjective factors might have also interfered as well as the objective ones. For example, had he or she been annoyed by any distracting and irrelevant thought when trying to relax or perform a task? Just as the subject started to answer this question, the experimenter, as if suddenly remembering her request, asked the subject whether he or she had hung the phone up, and immediately added, as if

continuing her question: did the subject, for example, remember about it while relaxing or working. All the answers of the subject were recorded.

Variants 2 and 5 (periods filled with an uninteresting activity). These variants were carried out in the same way as the above-mentioned variants with the sole difference that the subjects in the second room performed a rather monotonous task (Bourdon's test) for five minutes, which required, however, intensive attention. Furthermore, the experimenter's request in the second variant, like the first variant, elicited an unimportant intention in the subject, while in the fifth variant, as in the fourth variant, the intention was an important one.

Variants 3 and 6 (periods filled with an interesting activity). These variants differed from those decribed above in that the subjects in the second room performed an interesting task connected with making decisions which also required intensive attention. In particular, the subjects had to determine whether the people in various photographs were murderers or not. In the third variant the experimenter's request caused an unimportant intention, while in the sixth variant it was an important one.

It should be noted that the measuring of reaction time in the first lab, as well as the 'experiments' carried out in the second room during the five minutes, were all irrelevant with regard to the main purpose of this experiment. This concerned only the registering of the dependent variable, i.e. recording whether the subject had hung up the receiver or not while leaving the second room.

Results and discussion

Results are given in Table 2. The data are represented for any pair of levels of the two independent variables. Thus, for example, out of the 50 subjects who were in conditions of unimportant intention and unfilled intervening period, 16 had perseverations and 15 of them remembered intention, while out of the 34 subjects who did not have perseverations, 12 of them remembered intention. Overall, of these 50 subjects, regardless of whether they had perseverations or not, 27 were able to remember the intention. This number is given in heavy type.

Statistical analysis of data given in Table 2 revealed the effects of both factors (factor 1: $\chi^2 = 68{\cdot}34$, d.f. $= 1$, $P < 0{\cdot}001$; factor 2: $\chi^2 = 9{\cdot}31$, d.f. $= 2$, $P < 0{\cdot}01$). Such results indicate that the more important intention is, the higher the probability of remembering it at an appropriate moment. And, respectively, the more interesting an activity is for a person during an intervening period, the less is the probability of remembering an intention at an appropriate moment. However, when a similar analysis was undertaken of the data of only those subjects who did not have perseverations throughout the intervening period (230 subjects), the effect was confirmed for the first factor only. This result enables us to consider the importance of intention as a factor directly affecting remembering intention since the influence of the intervening period is presumably mediated with perseverations occurring involuntarily in a subject's consciousness during the intervening period.

Quite similar results were also obtained in those cases where the dependence of remembering intention from one factor was considered separately for every level of the second one, i.e. for the purpose of establishing the dependence of remembering intention from its importance, the corresponding statistical analysis was carried out separately for each level of intervening period and vice versa.

This detailed analysis of the data suggests the possibility of some interaction existing between these two factors. But since the dependent variable of interest here – remembering intention – pertains only to a nominal scale (i.e. in this experiment it serves as a qualitative category), it was impossible to use the usual methods of analysis of variance which imply the attribution of some quantitative scores to the subjects, and enable one to calculate the means and variance, etc. Therefore, a multidimensional information analysis has been applied which enables one to reveal interaction between two independent variables when the dependent variable belongs to a qualitative category (Attneave, 1959).

Carrying out an analysis on the data obtained from 300 subjects does not confirm the

existence of interaction between the importance of intention and the character of the intervening period. However, significant interaction has been revealed when the analysis was undertaken on the data of those 230 subjects who had no perseverations during the intervening period ($\chi^2 = 17{\cdot}33$, $P < 0{\cdot}01$).

The data presented in Table 2 also offer the possibility of ascertaining the role of perseveration in remembering intention. A slight positive (albeit reliable) correlation turned out to exist between the occurrence of perseveration and remembering intention at an appropriate time ($\varphi = 0{\cdot}354$, d.f. $= 1$, $P < 0{\cdot}001$).

As to the probability of perseveration proper occurring during the intervening period, the results obtained show that this probability does not depend significantly on the importance of intention ($\chi^2 = 3{\cdot}19$, d.f. $= 1$, $P > 0{\cdot}05$) but does depend significantly on the character of intervening period ($\chi^2 = 33{\cdot}6$, d.f. $= 2$, $P < 0{\cdot}001$).

General discussion

Experiment 1 confirmed the hypothesis that remembering intention at an appropriate moment and remembering contents or facts acquired in the past may be considered as two separate forms of memory. The retention of particular contents by no means warrants the due remembering of intention connected with these contents and vice versa. Indeed, when one forgets to carry out an intention at an appropriate time the knowledge concerning the contents of this intention may still be preserved in memory.

The present result is not unexpected insofar as memory investigators have recently become rather doubtful whether human memory can be considered entirely 'good' or 'bad'. It turned out that even remembering various contents (retrospective remembering) itself is not something homogeneous, but rather relies on various memory skills. For example, Underwood *et al.* (1978) examined intercorrelations of the performance of 200 subjects on 31 laboratory memory tasks. Factor analysis revealed separate factors for free recall, paired-associate learning, memory span and verbal discrimination. On the other hand, in Herrman & Neisser's (1978) questionnaire study of everyday memory abilities, besides the presence of a general factor, the existence of at least eight different memory factors was also established. One of these factors, which involves forgetting what one has just done, or intended to do, the authors call absent-mindedness. The main result obtained in the present laboratory Expt 1 seems to give further support to the data from this questionnaire as well as to the study of Meacham & Leiman (1975) where equally no correlation was found between prospective and retrospective remembering.

Experiment 2 was carried out in order to investigate the factors affecting remembering intention. As was expected, both independent variables (factors) – the importance of intention and the character of intervening period – turned out to have significant influence on remembering intention. However, the former is more influential as it directly affects remembering intention while the latter does so only indirectly via perseverations. The fact that motivation must be the critical variable in remembering intention has also been suggested by Meacham & Singer (1977) who found 'that a moderate incentive (i.e. the chance to be one of four persons out of approximately 40 winning five dollars each) was sufficient to lead to increases in prospective remembering, as assessed by the number of days and times post cards were mailed late' (p. 196).

However, with regard to the character of the intervening period, or intervening activity as Meacham & Colombo (1980) call it, there is a certain discrepancy between the results of Expt 2 and those obtained by Meacham & Colombo. The latter experiment was mainly carried out in order to ascertain whether external retrieval cues are effective in facilitating prospective remembering of young children. In this experiment the intervening period (seven minutes) was filled either with a Reinforcement Contingency Interview, which the

authors consider rather demanding for young children, or with a simple game with playing cards. No effect of varying difficulty of intervening activity was found [although Meacham & Colombo (1980) conclude that 'the intervening activity ought to be included as an important parameter in future research' (p. 130)]. However, the effect of intervening activity has been established here in Expt 2. This discrepancy between the experiment of Meacham & Colombo and Expt 2 may be attributed to the fact that, in the latter, the intervening period was varied not with regard to the difficulty of the task but with regard to its being filled/not being filled with an interesting activity.

Nevertheless, it seems quite plausible to assume that various degrees of task difficulty may also affect remembering intention, i.e. the more difficult the task is, the more absorbed a person is in it, and therefore the more likely he or she is to miss an appropriate moment. But the same degree of absorption may also be reached during an interesting activity. If so, then Meacham & Colombo's findings may be interpreted in the following way: presumably these two intervening tasks did not differ much in the sense of involvement they elicited from the subjects. In reality, if the Reinforcement Contingency Interview was rather difficult for the children who were therefore quite occupied with this task, then obviously the second task – the game with playing cards – though simple, might have been so interesting that they were absorbed in it to approximately the same degree as in the first task.

The interaction revealed in Expt 2 between the two independent variables (i.e. between the importance of intention and the character of the intervening period) indicates that, if an intention is an important one, then remembering it almost does not depend on the character of intervening period. But if it is unimportant, then its remembering will already depend substantially on the character of the intervening period.

The data obtained in Expt 2 enable us also to reveal the effect of perseveration on remembering intention. It must be noted that the positive correlation established between perseveration and remembering intention is apparently inconsistent with Lewin's (1926/1951) theoretical assumptions on the same subject. Indeed, according to Lewin, perseveration is a kind of substitute consummation as it brings about the discharge of internal tension connected with an intention, and therefore promotes the forgetting of this intention.

Further, the results obtained showed that the probability of perseveration occurring during the intervening period does not depend on the importance of intention but depends significantly on the character of the intervening period. This finding suggests the idea that, if a certain intention is important to a person, then in order to carry it out at an appropriate time there should be no special need for perseverations to occur as the importance of intention is a factor directly affecting remembering intention. But, if an intention is not an important one, its execution at an appropriate time should be ensured just by perseverations. Therefore, if people have to carry out an unimportant intention then it seems as if more activity is required from them during the intervening period. Namely, they should try to maintain perseverations occurring involuntarily in their minds, i.e. to think more about the execution of an intention.

If this last supposition is correct, then in cases of unimportant intention there ought to be a higher correlation between the occurrence of perseveration and remembering intention than in cases of important intention. In conditions of unimportant and important intentions the correlation coefficients φ were 0·433 (d.f. = 1, $P < 0{\cdot}01$) and 0·248 (d.f. = 1, $P < 0{\cdot}01$), respectively.

It follows from the above that the probability of remembering intention at an appropriate time, if the level of importance of intention is fixed, may be increased by increasing the number of perseverations, and, when the number of perseverations is fixed,

by increasing the importance of intention. Therefore, one and the same probability of remembering intention can be attained either by the high importance of an intention and a small number of perseverations, or by the low importance of an intention and a large number of perseverations. This last statement may be expressed by the following discursive formula:

$$P = (\text{importance of intention}) \times (\text{number of perseverations})$$

where P is the probability of remembering intention at an appropriate moment. [However, taking into consideration the fact that, if the perseverations do not occur during the intervening period, the probability of remembering intention at the end of this period is not yet equal to zero, then the latter formula might have been corrected in the following way: $P = (\text{importance of intention}) \times (\text{number of perseverations} + b)$, where b is a certain constant.]

If we now pick out from Table 2 the group of subjects carrying out unimportant intention and all of them having perseverations during the intervening period, then the calculation of the probability (the relative frequency) of remembering intention yields $P_1 = 23/27 = 0{\cdot}85$. It is noteworthy that this value does not differ significantly from $P_2 = 87/107 = 0{\cdot}81$, i.e. from the probability (the relative frequency) of remembering intention, calculated on the basis of data obtained from subjects who were to remember the important intention but who had no perseverations.

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Requests for reprints should be addressed to Lia Kvavilashvili, D. Uznadze Institute of Psychology, Georgian Academy of Sciences, 3 Makharadze St, Tbilisi 380007, USSR.