

German norms for 439 imagined actions

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As a part of a cross-cultural project including Austria, Croatia, and Sweden, a total of 128 male and female university students having German as their mother tongue rated 439 actions on 7-point scales measuring dimensions of Familiarity, Emotionality, Motor Activity, and Memorability. The participants rated actions of the type "to roll a ball", "to break a match" under instructions to imagine themselves performing each action. Higher overall means were found for women as compared to men on dimensions of Familiarity and Memorability, whereas the overall means on dimensions of Emotionality and Motor Activity were higher for men. All scales showed high reliability. The usefulness of norms of the present type in psychological as well as neuropsychological research on actions, and memory of actions is commented on.

Since the beginning of the 80s memory of actions has extensively been studied in the SPT-paradigm (Cohen, 1981; Engelkamp & Krumnacker, 1980; Saltz & Donnenwerth-Nolan, 1981). In this paradigm participants are instructed to perform simple SPTs (self-performed tasks or subject-performed tasks) like "move the plate", "blow in the air", "wink", whereupon participants' memory of the actions is assessed. In a control condition the same tasks are presented verbally (VTs) without requirement of performing them motorically. Usually, when SPTs and VTs are compared, an enactment effect (or SPT-effect) is obtained, that is, the retention of SPT items is better than the retention of VT items (e.g., Cohen, 1981; Engelkamp & Krumnacker, 1980). The superiority of retention of enacted over nonenacted action phrases usually falls in the range of

20-30% (Rönnlund, 1997). This enactment effect is very robust and holds for different tests of memory (e.g., free recall, cued recall, and recognition) and under quite different conditions of the study phase.

Several attempts to explain for the enactment effect have been put forward. Cohen (1981, 1983) suggests that the enactment effect is due to a pre-dominantly non-strategic encoding on the part of SPTs as compared to VTs. According to Bäckman and Nilsson (1984, 1985) SPTs allow for what these authors call a multimodal encoding, that is, a richer encoding than the more limited unimodal encoding occurring in VTs. Also Engelkamp and Zimmer (1985) allude to multimodal encoding, but stress that, in addition to verbal and imagery encoding, SPTs involve task-specific motor encoding. Most of the theoretical discussion and empirical work related to the SPT-paradigm has been focused on these three lines of reasoning, although a number of other hypotheses have also been suggested (e.g., Helstrup, 1986; Kormi-Nouri, 1994, 1995; Nilsson and Bäckman, 1989; Nyberg, 1993).

Recently Engelkamp (1990), and Engelkamp and Zimmer (1994) presented a more developed version of the Engelkamp and Zimmer (1985) notions. In this new version, called "the multimodal memory theory", not only multimodality but also the dimensions of item-specific/relational encoding and automatic/controlled processing are included to account for the enactment effect (see also Engelkamp, 1998).

As pointed out by several authors (e.g., Engelkamp, 1998; Engelkamp & Cohen, 1991; Kormi-Nouri, 1994; Nyberg, 1993), research within the SPT-paradigm has produced a substantial number of controversial and inconsis-

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tent results. For example, contradictory results have been reported concerning encoding strategies (Bäckman, Nilsson & Chalom, 1986; Bäckman, Nilsson, Herlitz, Nyberg, & Stigsdotter, 1991; Cohen & Bean, 1983; Cohen & Stewart, 1982; Glover, Timme, Deyloff, & Rogers, 1987), age-related impairment (Bäckman & Nilsson, 1984, 1985; Cohen & Faulkner, 1990; Cohen, Peterson, & Mantini-Atkinson, 1987; Guttentag & Hunt, 1988; Herlitz, Adolfsson, Bäckman, & Nilsson, 1991; Karlsson, Bäckman, Herlitz, Nilsson, Winblad, & Österlind, 1989; Knopf & Niedhardt, 1989; Lichty, Kausler, & Martinez, 1986; Nilsson & Craik, 1990; Nyberg, Nilsson & Bäckman, 1991), subject-performed tasks vs. experimenter-performed tasks (Arar, Nilsson, & Molander, 1993; Cohen, 1981, 1983; Cohen & Bean, 1983; Cohen et al., 1987; Engelkamp & Zimmer, 1984, 1985; Helstrup, 1987; Zimmer & Engelkamp, 1985), levels-of-processing effects (Cohen, 1981; Glover et al., 1987; Helstrup, 1987; Nilsson & Craik, 1990; Zimmer, 1992), controlled vs. automatic processing (Bäckman, Nilsson, & Kormi-Nouri, 1993; Engelkamp, 1998; Kormi-Nouri, Nilsson, & Bäckman, 1994), the importance of object characteristics (e.g., Cohen, 1981; Bäckman et al., 1986; Engelkamp & Zimmer, 1983, 1997; Nyberg et al., 1991), and item-specific vs. relational encoding (e.g., Bäckman et al., 1986; Zimmer & Engelkamp, 1989).

Although several of these controversies have been shown to be due to differences in methods, such as type of design or list length, it is possible that some of the observed inconsistencies are due to differences in item characteristics (cf. Norris & West, 1993; West, 1992). Within this research area there have been only few attempts to investigate or to control for the effects of basic characteristics as, for example, familiarity or word frequency (e.g., Cohen & Heath, 1988; Foley, Bouffard, Raag, & DiSanto - Rose, 1991; Knopf, 1991; Knopf & Neidhardt, 1989; Nilsson, Nyberg, Kormi-Nouri & Rönnlund, 1995). This is so much more notable, as some of the theories suggested, for explanations of the enactment effect which are based on concepts like item-specific encoding and modality-specific encoding, and consider properties of tasks as important (e.g., Bäckman & Nilsson, 1984, 1985; Engelkamp, 1998; Engelkamp & Zimmer, 1985).

As a part of a cross-cultural study comprising Austria, Croatia, and Sweden (Arar & Molander, 1996; Molander & Arar, 1998), the main purpose of the present study is to provide German norms for four different dimensions of items of the SPT type. These four dimensions are familiarity, emotionality, motor activity, and memorability, all of them judged to be of considerable value in the study of the memory of action events.

Familiarity is a variable of high importance in memory research in general (e.g., Schneider & Pressley, 1989), and in SPT research as well (e.g., Knop, 1991). Emotionality as defined in terms of intensity rather than direction (Rubin & Friendly, 1986) is considered as a valuable dimension in this context, partly because emotionality so defined has been shown to be weakly correlated with familiarity and similar variables (Paivio, 1968; Rubin, 1980; Rubin & Friendly, 1986), and partly because items used in previous SPT research seem to vary considerably in emotional intensity (cf. Arar et al., 1993).

The dimension of motor activity is included, as, for some authors (e.g., Engelkamp, & Zimmer, 1985; Engelkamp, 1990), motor encoding plays an important role for the explanation of the enactment effect. Different items may involve different amounts of activity during enactment. An item such as "look in the mirror" may involve less activity than the item "push the door".

The memorability dimension refers to how easy an item will be remembered over time. This dimension is included because retention of enacted and non-enacted items has been a focus of most research in this area and because memorability norms may be useful for studying metamemory for actions (Cohen, 1988; McDonald-Miszczak, Hubley, & Hultsch, 1996).

Research within the SPT-paradigm was carried out in several countries, and some of the inconsistencies discussed above might very well depend on cultural and linguistic differences. Even if the same items are used by researchers in different countries such cross-cultural differences may remain, as it is known that the associative aspects of the items such as familiarity or meaningfulness might differ considerably between linguistic environments (e.g., Molander, 1984, Nilsson, 1973). Normative studies, as the present one, help reducing the problem of such cross-cultural differences.

The first known normative studies in the German psychological literature were published by Albert and Murch, and by Lück in 1968. Up to now there are approximately fifty normative studies. The recently published "Handbuch deutschsprachiger Wortnormen" (Hager & Hasselhorn, 1994) comprises thirty studies dealing with associative, cognitive and emotional attributes of words and with typicality norms related to personality variables. Hager and Asmuss-Kunke (1996) published a study concerning norms for threat and familiarity of words. None of these German normative studies is dealing with motor actions. Thus, norms for action events would seem to be of benefit not only for research in the SPT field but also for research in other fields where motor actions are of interest.

METHOD

Participants

Participants were 128 students at the University of Klagenfurt, Klagenfurt, Austria. All participants (49 men and 79 women) were students attending psychology courses and participated in the study as part of a course requirement. The mean age was 27.6 years ($SD = 6.69$; total range = 19-44 years). The mean number of years of formal education, excluding university education, was 13.2 years ($SD = 1.69$), and the mean number of semesters spent at the university was 3.4 semesters ($SD = 2.49$). The participants, all of them having German as their mother tongue, were randomly divided into four subgroups, with the restriction that the number of men and women, and the mean age, was about the same in each subgroup. There was one subgroup for each dimension to be rated.

Item selection. Items were selected from lists of items previously used in published studies on SPTs. Specifically, items were included according to the following criteria:

(1) All 96 items from the study of Cohen (1981). As these items were used by other researchers as a kind of standard material, it was judged important to include them. Also, it was considered important that experiments with that material have been carried out in different languages.

(2) Items from studies of SPTs focusing on the dimensions of familiarity, emotionality, motor activity, and memorability. It was thought that the variability of the items within each dimension would be optimized in such a way. The studies by Knopf (1991), Arar, Nilsson, and Molander (1993), Nilsson and Bäckman (1991), and Cohen and Bryant (1991) were of relevance for that purpose. The items used in those four studies were originally produced in four different languages, that is, German, Croatian, English, and Swedish. In total, 211 items were selected from these studies.

(3) Items from Zimmer and Engelkamp (1984), who studied the effects of adverbial extensions on SPTs (i.e., "sharpen the pencil quickly" vs. "sharpen the pencil"). Ten such items were selected.

(4) Items randomly selected from other published studies (e.g., Engelkamp & Krumnacker, 1980; Engelkamp & Zimmer, 1984; Foley, Bouffard, Raag & DiSanto-Rose, 1991; Knopf & Neidhardt, 1989); Nilsson & Craik, 1990; Nyberg, Nilsson & Bäckman, 1991; Ratner & Hill, 1991; Zimmer & Engelkamp, 1984; Zimmer & Engelkamp, 1985), with exclusion of items that were too similar to each other and items that were too ambiguous. In total, 122 items were selected from these studies.

All in all, 439 items were selected from 15 studies. Twenty-six of these items, randomly selected, were presented twice in order to check for intra-rater reliability. Thus, the total list comprised 465 items.

Translation. Except for some items originally presented in German all items were translated and adapted to the Austrian version of German from English by a translator having German as her mother tongue. The correspondence of the German phrases with the English phrases was checked by the authors, one of which is Austrian. In some of the original studies, constituting the pool for selection of items, the items were originally presented in indicative mood (i.e., expressed in gerundial or infinitive form) and in some studies in imperative mood (cf. Helstrup & Molander, 1996). However, in the present study all items were presented with the verb in the infinitive form. Thus, an item like "cross your fingers" was presented in the form "to cross one's fingers".

Procedure

Booklets were given to the participants where the first page provided instructions about the particular dimension that was supposed to be rated and instructions about the rating scale. On the following 18 pages items were presented with 26 items on each page, except the last one. Twenty-six of the items occurred twice, randomly distributed over the pages, with the restriction that at least two pages should separate two identical items.

Items occurred in four different orders, that is, two random orders and the reverse of these orders. These four orders were distributed evenly in each dimension to be rated. Participants performed the ratings in groups in connection with attending classes. However, each participant rated only one dimension. After the booklets were handed out to the participants the experimenter explained the purpose of the study in general words, and asked the participants to carefully read through the materials. No information was given about the occurrence of repeated items. For the dimension of familiarity, the following instructions were given on the first page of the booklet:

"One of the dimensions along which actions can vary is familiarity. Some actions are very frequent and a majority of people has experienced them many times; others are hardly experienced by anyone.

This booklet contains a number of action phrases on each of the following pages. Your task is to rate the frequency of each action denoted by a phrase, that is, to rate how familiar or how frequent each action is in your realm of experience. Your ratings should express how often you have performed, observed or thought about each action.

You will make your ratings on a 7-point scale, where 1 stands for actions with low frequency of occurrence, and 7 stands for actions with high frequency of occurrence. Use 1 for actions that you have never experienced, or that you have experienced very seldom. For example, the phrase 'shave the kiwi fruit' denotes an action that you probably have never experienced. Use 7 for actions that have appeared in your experience very often. For example, you will probably rate as highly frequent the action denoted by the phrase 'turn the light on'. Use numbers between 1 and 7 for actions of intermediate frequency of occurrence.

Make your rating by encircling the number from 1 to 7 that best indicates your judgment. Encircle the appropriate number on the scale to the right of the action phrase. Feel free to use the entire range of numbers from 1 to 7. Do not be concerned about how often you use a particular number as long as it is your true judgment. Below are four examples. Read the phrase. Imagine yourself performing the action. Indicate the degree of familiarity of each action by encircling the appropriate number."

	Low		High
1. eine Murmel polieren (to polish a marble)	1	2	3 4 5 6 7
2. in ein Brot hineinbeißen (to bite the bread)	1	2	3 4 5 6 7
3. eine Elipse zeichnen (to draw an ellipse)	1	2	3 4 5 6 7
4. auf einen Kalender schauen (to look at the calendar)	1	2	3 4 5 6 7

"Try to be as careful as possible, as the results are to be used for research purposes. This is not a test of individual performance and there is no right or wrong answer. We are interested to know how people in general rate characteristics of different actions. Work in your own rate and don't care about what the other subjects are doing. The phrases are occurring in different orders for different subjects. Work fairly quickly but not so fast that you are careless in your ratings. This is no speed test and you have plenty of time to fulfil the task. If it is necessary you are allowed to look at the instructions whenever you want to. However, you are not allowed to look at the ratings you have made on previous pages. No questions are allowed after you have started the task. If you have any questions, please ask them now."

The booklets for Emotionality, Motor Activity, and Memorability comprised similar instructions except for the examples given and the first three paragraphs, which were changed in the following manner:

Emotionality: "One of the dimensions along which actions can vary is emotionality. Some actions may arouse strong positive or negative feelings in you, whereas other actions give rise to weak feelings or no feelings at all.

This booklet contains a number of action phrases on each of the following pages. Your task is to rate the emotionality of each action denoted by a phrase, that is, to rate the degree to which an action arouses feelings. Thus, it is the intensity of the emotion that is relevant, not the kind of emotion.

You will make your ratings on a 7-point scale, where 1 stands for actions with low emotionality and 7 stands for actions with high emotionality. Use 1 for actions that hardly arouse feelings or not at all. For example, the phrase 'think of a number' denotes an action that probably arouses little or no emotionality. Use 7 for actions that arouse feelings very easily. For example, the phrase 'kiss the snake' will probably arouse a high degree of emotionality. Use numbers between 1 and 7 for actions of intermediate degree of emotionality."

	Low		High
1. einen Kaugummi verschlucken (to swallow a bubble-gum)	1	2	3 4 5 6 7
2. einen Spielzeughund streicheln (to stroke a toy-dog)	1	2	3 4 5 6 7
3. ein Buch aufschlagen (to open a book)	1	2	3 4 5 6 7
4. ein Herz zeichnen (to draw a heart)	1	2	3 4 5 6 7

Motor Activity: "One of the dimensions along which actions can vary is in amount of motor activity. Enactment of some actions involve a large amount of motor activity, whereas enactment of other actions involve very little motor activity.

This booklet contains a number of action phrases on each of the following pages. Your task is to rate the amount of motor activity of each action denoted by a phrase, that is, how much you have to move an object or your body in order to carry out the action.

You will make your ratings on a 7-point scale, where 1 stands for actions with low motor activity, and 7 stands for actions with high motor activity. Use 1 for actions that involve a low degree of motor activity. For example, the phrase 'think of a number' denotes an action that involves a low degree of motor activity, if any at all. Use 7 for actions that involve a high degree of motor activity. For example, the phrase 'climb the ladder' denotes an action that involves a high degree of motor activity. Use numbers be-

tween 1 and 7 for actions of intermediate degrees of motor activity."

	Low			High			
1. hinunterschauen (to drop one's eye)	1	2	3	4	5	6	7
2. eine Schreibmaschine heben (to lift a typing machine)	1	2	3	4	5	6	7
3. mit einem Pinsel malen (to paint with a paint brush)	1	2	3	4	5	6	7
4. einen Stuhl wegschieben (to push a chair)	1	2	3	4	5	6	7

Memorability: "One of the dimensions along which actions can vary is memorability. Some actions may be very easy to remember and recall after a while; others may be very hard to remember and recall.

This booklet contains a number of action phrases on each of the following pages. Your task is to rate the memorability of each action denoted by a phrase, that is, to rate how easy you will recall an action if you were to perform it.

You will make your ratings on a 7-point scale, where 1 stands for actions with low memorability and 7 stands for actions with high memorability. Use 1 for actions that you think are very hard to recall. For example, if you perform an action and that action very soon afterwards is difficult or impossible to recall, you would use 1. Use 7 for actions that you think are very easy to remember. For example, if you perform an action and that action is very easy to recall after a long time, you would use 7. Use numbers between 1 and 7 for actions of intermediate degrees of memorability."

	Low			High			
1. eine Marmor polieren (to polish a marble)	1	2	3	4	5	6	7
2. in ein Brot hineinbisschen (to bite the bread)	1	2	3	4	5	6	7
3. eine Ellipse zeichnen (to draw an ellipse)	1	2	3	4	5	6	7
4. auf einen Kalender schauen (to look at the calendar)	1	2	3	4	5	6	7

Before the start of the rating task the experimenter answered any questions and asked the participants to check the booklet for possible omissions after the completion of the task. Most subjects finished the task in less than one hour.

RESULTS AND DISCUSSION

Mean ratings and standard deviations on each dimension were calculated for all 439 items. A sample of these values are presented in Table in Appendix. The action phrases in Table are given in German as well as in English, but listed in accordance with German alphabetical order.

A 2(Sex) x 4(Random Order) x 4(Dimension) ANOVA was performed on the overall mean ratings. This analysis showed a significant main effect of Dimension, $F(3,96) = 8.80, p < .01$, and a significant Dimension x Sex interaction, $F(3,96) = 2.98, p < .04$. No other effects were significant. Overall means, standard deviations, and rating ranges are presented in Table 1 for all participants, and for men and women separately.

The effect of Dimension was due to lower overall ratings in the Emotionality dimension as compared to the other three dimensions. A Tukey test showed that the overall mean of Emotionality reliably differed from the means of Memorability and Familiarity ($p < .05$). There were no reliable differences ($p > .05$) between the means of Familiarity, Motor Activity, and Memorability.

Table 1
Overall Mean, Standard Deviation, and Rating Range,
in Each Dimension

	Dimension			
	Familiarity	Emotionality	Motor Activity	Memorability
All				
<i>M</i>	3.46	2.67	3.14	3.66
<i>SD</i>	0.67	0.67	0.81	1.09
Men				
<i>M</i>	3.77	2.29	3.06	3.89
<i>SD</i>	0.76	0.42	0.66	1.04
Women				
<i>M</i>	3.25	2.91	3.19	3.53
<i>SD</i>	0.52	0.70	0.52	1.12
Range (All)	1.19-6.59	1.25-5.94	1.13-6.47	2.38-5.91

As shown in Table 1, the Dimension x Sex interaction is the result of lower overall means for women as compared to men for the dimensions of Familiarity and Memorability, whereas the means for women as compared to men are higher for the dimensions of Motor Activity and Emotionality. These findings deviate somewhat from the results of the study by Arar and Molander (1996), where there were no significant sex differences between overall means, and the results of Molander and Arar (1998), who found a main effect of sex with higher mean values on the part of women. However, in all three studies significant sex differences in ratings of a varying number of items on each dimension have been found. In the present study, there were 2 items rated significantly higher by women and 50 items rated higher by men in the Familiarity dimension ($p < .05$). Corresponding values were 78 vs. 0 for Emotionality, 13 vs. 5 for Motor Activity, and 1 vs. 10 for Memorability.

Information about sex differences is scarce in most studies in which verbal material was rated. In relatively few cases where such information is presented, results are ambiguous with respect to type of dimension rated and direction of the sex difference (e.g., Benjafield & Muckenheim, 1989; Benjafield, Frommhold, Keenan, Muckenheim & Mueller, 1993; Campos & Astroga, 1987; Campos & Gonzalez, 1991, 1992; Campos & Sueiro, 1990; Friendly, Franklin, Hoffman & Rubin, 1982; Toglia & Battig, 1978). Nevertheless, it is of importance to present mean ratings separately for men and women, as the sex difference on some items may be considerable.

Frequency distributions of item means were calculated and found to be normal (Memorability) or approximately normal (Motor Activity, Emotionality, and Familiarity). The latter three dimensions tended to be positively skewed. Skewness values for Familiarity, Emotionality, Motor Activity, and Memorability were .241, .970, .538, and .768, respectively. Thus, the item-mean values are well distributed on the low-high continuum in all dimensions, although there were few or no values in the highest interval (6.00-6.99) for the Emotionality, Motor Activity, and Memorability dimensions.

Reproducibility. For each dimension the participants were randomly divided into two subgroups with the restriction that the two groups should be comparable with respect to median age and distribution of sex. As a measure of stability of the ratings, Pearson correlations were calculated for the item means of the two groups. For Familiarity, Emotionality, Motor Activity, and Memorability, the coefficients were .94, .84, .91, and .73, respectively ($p < .01$). Judging from these coefficients, the memorability of an item seems to be somewhat more difficult to rate as com-

pared to other three dimensions. Reliability was assessed by comparison of first with second rating of those 26 items that were repeated in the booklets. Correlations for the repeated items were .98, .97, .97, and .90, for Familiarity, Emotionality, Motor Activity, and Memorability, respectively ($p < .01$). Again, the coefficient for Memorability is somewhat lower than those for remaining 3 dimensions. Overall, however, both methods of calculation witness that ratings are highly stable and reliable.

Adverbial extensions. For 10 of the items the booklets also included adverbial extensions of these items (e.g., "to sharpen the pencil" and "to sharpen the pencil quickly"). The Pearson correlations between the basic and the adverbial form over the 10 items were .54 ($p > .05$), .95 ($p < .01$), .92 ($p < .01$), and .89 ($p < .01$) for Familiarity, Emotionality, Motor Activity, and Memorability, respectively. Overall means and standard deviations for 10 pairs of items for each dimension are presented in Table 2.

The differences in overall mean ratings between items with and without adverbial extension were tested by t-tests. Differences were significant for Familiarity ($p < .01$) and Emotionality ($p < .01$). However, adverbial extensions did not make a difference in the Motor Activity and the Memorability dimensions ($p > .05$). In the Emotionality, Motor Activity, and Memorability dimensions items with extension were rated higher, as compared to those without extension. In the Familiarity dimension it is the other way around, adverbial extensions giving rise to lower ratings. If extending an item adverbially can be seen as enrichment of the item the present results are in agreement with results reported by Nilsson, Nyberg, Kormi-Nouri, and Rönnlund (1995). These authors found that enriched action events (e.g., "wave your hands as a conductor") were rated as less familiar than events presented in the basic form (e.g., "wave your hands").

Table 2

Means and standard deviations for 10 items with and without adverbial extension

Items	Dimension							
	Familiarity		Emotionality		Motor Activity		Memorability	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Without extension	5.26	.85	2.71	.76	3.10	.95	3.40	1.71
With extension	3.63	.83	3.28	.82	3.24	.97	3.69	1.27

Table 3

Intercorrelations Among Dimensions of Familiarity, Emotionality, Motor Activity, and Memorability

Dimension	Emotionality	Motor Activity	Memorability
Familiarity	-.23**	-.39**	-.62**
Emotionality		.20**	.60**
Motor Activity			.49**

** $p < .01$

Intercorrelations. Table 3 presents the intercorrelations of the four dimensions. It should be noted that the sizes of correlations involving Emotionality and Memorability are likely to be underestimated, as the range of these two variables is somewhat restricted (see Table 1).

As can be seen in Table 3, all correlations with the Familiarity dimension are negative. The other three dimensions are positively related to each other. The low coefficients among Familiarity, Emotionality, and Motor Activity do, indeed, testify that different dimensions were measured. Relatively low correlation between Familiarity and Emotionality is consistent with previous research (e.g., Rubin & Friendly, 1986). High negative correlation between Familiarity and Memorability is interesting since familiarity was found to be positively related to recall performance in research on SPTs (e.g., Arar, Kolić-Vehovec & Molander, 1997; Knopf, 1991; Knopf & Neidhardt, 1989). Hence, it is to be expected that Familiarity should be positively related also to Memorability, given that Memorability can be taken to reflect free recall measures. On the other hand, if subjects tend to emphasize unusual or unfamiliar items when rating Memorability, the negative correlation makes sense, as a high degree of distinctiveness is typical for unfamiliar items (Einstein & McDaniel, 1987; Hunt & Marschark, 1987). In recognition tests, particularly, a high degree of distinctiveness is of importance for good memory performance. Also, it is not clear whether Memorability instructions have been understood by the participants to be instructions about recognition rather than free recall.

Validity. In the study by Knopf (1991) memory of unfamiliar actions was compared with memory of actions of low and high familiarity. In her study items were rated on a 6-point scale as to degree of familiarity by an independent sample of participants. The participants indicated on the scale how often they performed the action in question in everyday life, and indicated also the last time they had performed the action. As the items used by Knopf were rated in the present study too, it is possible to validate her famili-

arity ratings against the present Familiarity ratings (or vice versa), both studies thus comprising German-speaking participants.

Mean Familiarity ratings in the present study corresponding to high, low, and unfamiliar items in the Knopf (1991) study were 4.87, 2.60, and 1.82 respectively. The differences between these means are all significant ($p < 0.01$). Although the two rating procedures deviate in some respects from each other the correspondence is very good. For Emotionality and Motor Activity there are no studies on German-speaking participants which allow for proper comparisons. However, in the studies by Arar and Molander (1996) and Molander and Arar (1998) the dimensions of Emotionality and Motor Activity were validated successfully by comparisons with studies on Croatian (Arar, Nilsson & Molander, 1993) and Swedish (Nilsson & Bäckman, 1991) participants, respectively. Future studies will show whether similar findings can be obtained for Emotionality and Motor Activity, as well as for Memorability, also for German-speaking participants.

If the normative values obtained in the present study are to be used for designing experiments using the STP paradigm it might be asked whether the difference in instructions used in this study (i.e., to imagine enacting) and the standard instructions in the SPT paradigm is of importance for the validity of the rated items. A related question concerns the possibility of differences between the characteristics of imagined objects and those of the very same objects actually presented to the participants in a SPT study. Both of these questions were addressed in the Molander and Arar (1998) study for the Familiarity dimension, and it was found that in neither case was there any significant effects ($p > .05$) of the difference in procedure. Although further studies are needed to examine possible differences for the other three dimensions, it is very likely that similar findings would be obtained for the German normative values as well.

In conclusion, this study presents 439 action events rated by German-speaking participants in Familiarity, Emotionality, Motor Activity, and Memorability. These four dimensions are of high importance in psychological and neuropsychological studies of actions and memory of actions. The normative values in each of the dimensions have been shown to be highly reliable. Also, the results suggest good criterion validity. Providing normative values will be helpful for better understanding of the memory mechanisms involved as well as better understanding of some of the discrepancies reported in the SPT literature. Furthermore, in many neuropsychological studies there is a need for items controlled for in various dimensions. For example, studies on the processing of emotional words in the limbic brain structures (cf. Beauregard et al., 1997), studies on psychological and neural processes that underlie the re-

trieval of conceptual and lexical knowledge for actions (cf. Fiez & Tranel, 1997), and studies on brain regions involved in verbal versus enactment conditions (cf. Heil et al., 1999) might benefit from norms of the present type.

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APPENDIX

Table 1

Means and Standard Deviations for a sample of 44 (out of 439 used in the study)
Actions rated for Familiarity (Fam), Emotionality (Emo), Motor Activity (Mot), and Memorability (Mem).

No.	Item	Fam		Emo		Mot		Mem	
		M	SD	M	SD	M	SD	M	SD
4.	am Kopf kratzen to scratch one's head	5.06 ^M	1.87	2.50	1.63	2.31	1.42	2.53	2.06
26.	aufstehen und sich hinsetzen to stand up and sit down	5.62	1.88	1.94 ^W	1.54	3.16	1.53	2.88	2.32
27.	aus einem Glas trinkento drink from a glass	6.47	1.39	1.88	1.41	2.62	1.39	2.78	2.43
43.	das Licht aufdrehen to turn on a light	6.34	1.45	2.31 ^W	1.51	2.06	1.05	3.22	2.60
48.	den Arm massieren to massage one's arm	4.00	1.74	3.09	1.42	4.16	1.65	3.13	1.93
52.	den Kopf drehen to turn one's head	5.97 ^M	1.51	1.87	1.13	2.59	1.54	2.84	2.44
58.	den Mund öffnen to open one's mouth	5.78	1.75	2.12	1.62	1.68 ^W	0.79	2.53	2.23
64.	der Uhr zuhören to listen to the clock	3.00	1.80	3.16 ^W	1.78	1.13	0.34	3.88	1.95
65.	die Achseln zucken to shrug one's shoulders	4.97	1.62	2.63	1.50	2.22	1.13	2.63	2.06
88.	die Seide fallenlassen to drop the silk	1.56	1.24	2.03	1.38	1.75	0.80	3.47	2.05

No.	Item	Fam		Emo		Mot		Mem	
		M	SD	M	SD	M	SD	M	SD
93.	die Tür aufsperrern to unlock a door	6.50	1.22	2.31	1.64	2.84	1.08	3.22	2.41
95.	die Zahl 5914 wiederholen to repeat the number "5914"	1.78	1.60	1.69	1.51	1.84	1.14	3.75	2.37
117.	ein Heinzelmännchen aufheben to pick up an elf	1.47	1.22	3.38	2.32	3.61	1.82	4.69	2.51
118.	ein Huhn rupfen to pluck a chicken	1.56	1.61	4.63	2.23	5.28	1.22	4.97	2.35
127.	ein Orchester dirigieren to conduct an orchestra	1.53	1.44	5.50	1.76	5.78	1.43	5.59	2.17
128.	ein Papierknäuel auseinanderfalten to unfold a ball of paper	2.88	1.90	2.31	1.67	3.25 ^W	1.48	3.44	2.03
139.	ein Taschentuch zusammenlegen to fold a handkerchief	3.47	1.98	1.62	0.94	2.81	1.49	2.56	2.02
161.	eine Galeere rudern to row a galley	1.41	1.48	4.16	2.23	6.47	0.95	5.19	2.42
181.	eine Kusshand schicken to blow a kiss	3.19	1.96	4.66	1.64	2.94	1.41	4.28	2.08
192.	eine Perücke aufsetzen to put on a wig	1.56	1.29	3.69 ^W	1.94	3.44	1.63	5.44	2.03
193.	eine Pille nehmen to take a pill	3.66	2.43	3.72	1.95	2.06	1.01	4.06 ^M	2.33
200.	eine Schreibmaschine hin und her wiegen to rock a typewriter	1.56	1.46	2.06	1.66	4.53 ^W	1.34	4.09	1.96
218.	eine Zahl lesen to read a number	6.25	1.44	1.41	1.21	1.31	0.78	2.81	2.25
231.	einen Ball werfen to throw a ball	4.56 ^M	1.70	2.59	1.62	3.91	1.55	3.38	2.23
233.	einen Besen mit Fett beschmutzen to grease a whisk	1.47	1.19	2.75	1.98	3.44	1.44	4.34	2.06
245.	einen Dinosaurier streicheln to pet a dinosaur	1.31	1.18	5.56 ^W	2.02	4.44	2.21	5.84	2.37
258.	einen Kaktus umarmen to hug a cactus	1.25	1.08	5.13	2.14	4.13	1.90	5.91	2.19
262.	einen Knoten machen to make a knot	4.53 ^M	1.95	1.56	0.91	3.69	1.86	3.16	2.36
292.	einen Ring auf den Finger stecken to put a ring on one's finger	4.09	2.12	3.66	2.01	2.75	1.32	4.56	2.37
304.	einen Speer durch die Luft schleudern to hurl a javelin	1.97	1.84	4.00	1.74	5.50	1.32	5.09	2.13
325.	etwas an die Innenseite von Hand- schellen eingravieren to engrave something inside hand- cuffs	1.19	1.06	3.44 ^W	2.09	5.09	1.73	5.00	2.49
326.	etwas zeitlich abstimmen to time something	5.59	1.52	2.41	1.50	1.59	1.21	3.84	2.14
339.	in einen Fingerhut blasen to blow in a thimble	1.38	1.10	2.16	1.89	2.25	1.24	3.28	2.10
343.	ins Mikrophon singen to sing into the microphone	2.13	1.93	4.94 ^W	1.92	3.06 ^W	1.48	5.37	2.08

No.	Item	Fam		Emo		Mot		Mem	
		M	SD	M	SD	M	SD	M	SD
348.	Lachen to laugh	6.19	1.42	5.13	1.83	2.19 ^W	1.38	3.25	2.51
368.	mit der Pistole schießen to fire the pistol	1.84	1.90	5.28 ^W	2.26	3.53	1.70	5.62	2.06
370.	mit einem Bleistift schreiben to write with a pencil	5.72	1.73	1.59	0.80	3.25	1.41	3.31	2.38
387.	neben einem Gorilla knien to kneel by a gorilla	1.34	1.26	5.94 ^W	1.50	3.09	1.84	5.69	2.26
394.	Reißnägel nummerieren to number thumb tacks	1.25	1.11	2.38 ^W	2.25	3.09	1.75	5.16	2.54
398.	schlucken to gulp down	6.41	1.34	1.91	1.55	1.91 ^W	1.20	2.75	2.54
408.	sich strecken to stretch one's self	5.72	1.51	3.13	1.58	3.53	1.80	2.84	2.33
429.	über eine Schlange steigen to blow a vase of glass	1.63	1.36	5.78	1.64	3.56	1.72	5.53	2.17
432.	zur Zimmerdecke aufschauen to look up at the ceiling	4.41	1.86	2.38	1.64	1.84	0.99	2.59	2.15
439.	2+3 zusammenzählen to add 2+3	4.34	2.29	1.56	1.34	1.22	0.49	2.41	1.93

Note. When there is a significant difference $p < .05$ between the male and female mean rating value, the superscript of the mean value shows if men (M) or women (W) have the higher value.