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A Survey of Aviator Perceptions of Aviation Emergency Procedure Training and Recall

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Aircrew Health and Performance Division

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13. ABSTRACT *(Maximum 200 words)*

The first step in the U.S. Army's current practice of teaching aviation emergency procedures is to require student pilots to learn the textual procedures through rote memorization. No standardized guidance or memorization techniques are provided as best practices. The U.S. Army is particularly demanding of their student and graduate pilots in that it requires the memorization of an extensive number of emergency procedures (many more than the other military services), each of which usually contains multiple purposefully-ordered steps. Experience shows that hours of study do not assure accuracy and timeliness of recall.

The purpose of this written survey was 1) to identify (based on anonymous subjective opinion data) the attitudes, perceptions, and thoughts of aviators regarding their study habits and the Army's traditional method of teaching and testing aviation emergency procedures; 2) to assess the tolerability of aviators to changes to current training methods and to learning novel memorization techniques; and 3) to determine if further research into novel training methods is warranted.

With a response rate of 97%, 194 operational Army helicopter aviators at Fort Rucker, Alabama, provided anonymous opinion data. These personnel consisted of student pilots, instructor pilots and those attending helicopter instructor pilot courses. The results indicate that while most respondents are satisfied with their chosen memorization method(s), a large percentage (over 65%) would be interested in learning different/additional methods. The results suggest that learning and retaining aviation emergency procedures can be difficult for some pilots. Further research may provide Army pilots with better ways to learn and retain the required information.

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Table of contents

Table of contents (continued)

List of figures

List of tables

Introduction

The first step in the U.S. Army's current practice of teaching aviation emergency procedures is to require student pilots to learn the textual procedures through rote memorization. The Army is particularly demanding of their student and graduate pilots in that it requires the memorization of an extensive number of emergency procedures (many more than the other military services require), each of which usually contains multiple purposefully-ordered steps. However, no standardized or formal guidance or memorization techniques are provided or recommended. The satisfactory demonstration of emergency procedures recall and performance is a requirement for the completion of flight school and the annual evaluation of graduate pilots (Headquarters, Department of the Army, 1996).

Background and military significance

Army pilots are required to memorize a multitude of emergency procedures containing multiple textual steps and are then required to recall them verbatim during simulated (practice) emergencies in preparation for actual emergencies. The syntax of the steps tends to be structurally cumbersome and may contribute to the difficulty in memorizing them. The maintenance of these memorized textual procedures, even after they are "learned," requires hours of study "refreshing one's memory" in order to maintain proficiency, and yet, experience shows that such efforts do not assure accuracy and timeliness of recall. In a reasonable comparison, a study of the memory strategies of professional actors by Noice (1992) discovered that there was unanimous agreement among the actors that they do not memorize their lines in a rote-type fashion (as the Army requires). Even if the Army student pilot progresses beyond rote memorization (the lowest level of learning) to the higher levels of *understanding*, *application*, and *correlation* (U. S. Army Aviation Center, 1991), the form (the textual format) in which the emergency procedures are presented, combined with disuse or infrequency in performing the procedures once the student graduates from flight school, contributes to the general tendency to forget the specific procedures. It is common knowledge among graduate pilots that the memory of these steps is quite perishable and requires a considerable amount of time rehearsing even after years of experience and practice. The consequences of forgetting them can range from an unsatisfactory grade during flight evaluations to the more serious inability to respond to and perform correctly during actual emergency situations (Cumbie, 2003).

Too many times educators tell students *what* to learn, yet fail to teach students *how* to learn. Ashman and Conway (1997) describe a paradigm shift in learning since the mid-1980's from one in which the "emphasis is on content and acquiring a body of right knowledge" to one in which the "emphasis is on learning how to learn." Knowing "how to learn" involves the learning of strategies. Strategies refer to the many methods in which we take in (encode), store and retrieve (decode) information (Ashman and Conway). Unfortunately, strategies used for enhancing learning are not an innate student ability. Squire and Kandel (quoted by King-Friedrichs, 2001) stress that teachers must build context retrieval cues into the learning process that will likely be present when the students need to recall the concept.

The results of this survey serve as a source of foundational and user data in support of a future, more comprehensive study of alternative and novel methods of training and retaining aviation emergency procedures by aviators.

Objectives

Based on the apparent lack of information (other than anecdotes) or previous research in this specific area, a survey (Appendix A) was administered to Army helicopter aviators (student pilots, instructor pilots and those attending helicopter instructor pilot courses at Ft. Rucker, Alabama). The purposes of this survey were to:

1. identify (based on anonymous subjective opinion data) the attitudes, perceptions, and thoughts of aviators regarding their study habits and the Army's traditional method of teaching and testing aviation emergency procedures;

2. explore the possibility of relationships among pilots of different aircraft and experience levels;

3. assess the tolerability of aviators to changes to current training methods and to learning novel memorization techniques; and

4. determine if the attitudes of Army helicopter pilots provide some indication that future research into novel training methods is warranted.

Methods

Materials

Two-hundred paper questionnaires (Appendix A) were distributed to solicit pilot attitudes, perceptions, and thoughts regarding their study habits and Army aviation emergency procedures training. Of the 200 questionnaires distributed, 194 were returned providing a response rate of 97%.

Subjects

The respondents were 194 operational Army helicopter aviators who were anonymously surveyed at Ft. Rucker, Alabama. These personnel consisted of student pilots, instructor pilots and those pilots attending helicopter instructor pilot courses. Many of these aviators were members of units stationed around the world on temporary duty at Fort Rucker and represented pilots qualified in many U.S. Army aircraft types. There were no restrictions on age, rank, gender, etc.

2

Procedures

The survey participants were asked to fill out the questionnaire in the summer of 2005 during regularly scheduled safety meetings and other gatherings of pilots at Fort Rucker airfields.

Results and Discussion

The results (descriptive statistics) of the survey are presented below with comments regarding each set of data collected. Crosstabulations have been performed on some of the findings to better understand the associations between various data.

Demographics

Current positions/jobs

The findings (Table 1) indicate that the survey respondents represented a wide range of aviation career paths which served to provide input from varied perspectives and experiences. It is useful that the population was nearly evenly split between student pilots (45.9%) with the most recent exposure to Army training methods, and graduate pilots (54.1%) with many years of Army aviation training experience.

Table 1.
Current primary position or job title.

Position/Job Description	Frequency	Percentage
Student Pilot	89	45.9
Line Pilot	6	3.1
Aviation Platoon Leader	8	4.1
Standardization Instructor Pilot	20	10.3
Aviation Company Commander	3	1.5
Unit Trainer	1	.5
Instructor Pilot	59	30.4
Aviation Staff Officer (any level)	4	2.1
Maintenance Test Pilot	4	2.1
Total	194	100.0

Flight experience

The demography of rotary-wing (helicopter) and fixed wing (airplane) flight experience of the sample population is presented in Figures 1 and 2, respectively. Flight hours are usually reflective of an aviator's level of maturity, responsibility, and ability. Generally speaking, the

greater the number of hours, the higher the pilot's capabilities and experience. Note, also, that with more experience (flight hours) comes more exposure to emergency procedures training and practice.

Out of the 194 respondents, two did not provide any answer as to their number of flight hours (Figure 1). Regarding fixed wing time (Figure 2), 144 respondents reported no fixed wing flight experience at all.

Total Rotary Wing Flight Hours
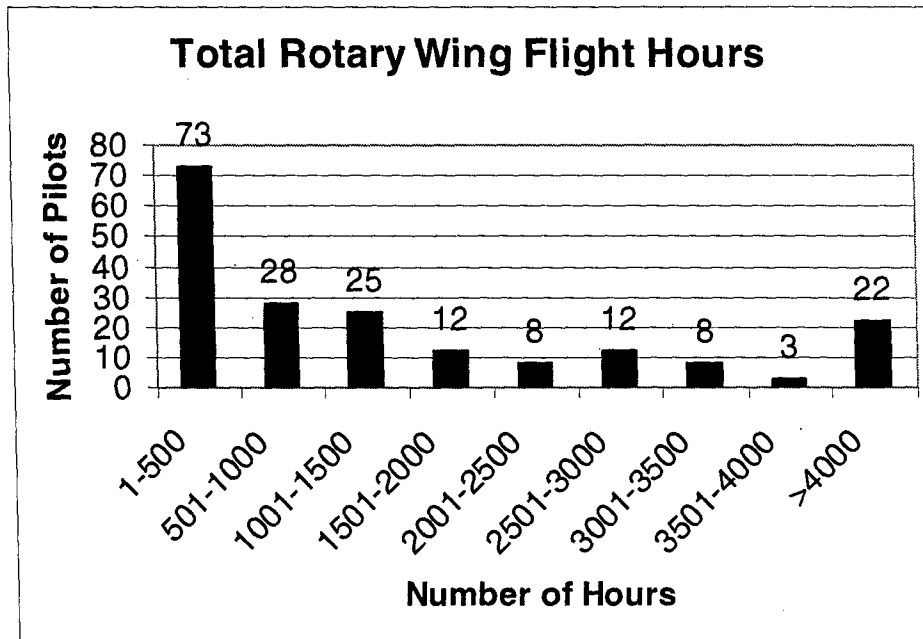

Figure 1. Total rotary wing flight hours. (Three participants did not report rotary wing hours.)
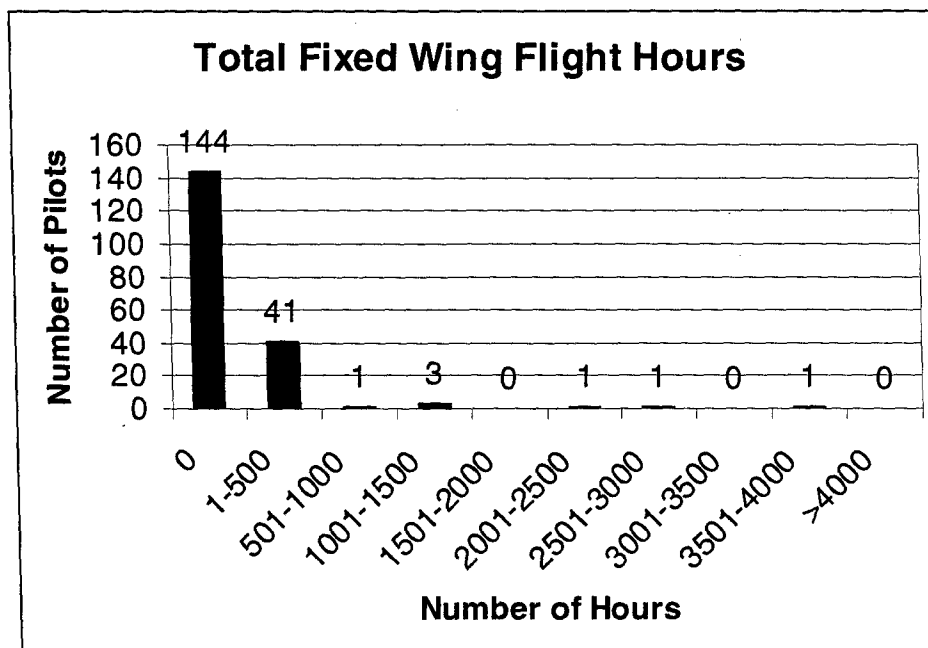
Total Fixed Wing Flight Hours

Figure 2. Total fixed wing flight hours. (Two participants did not report fixed wing hours.)

Aircraft qualifications and currency

Table 2 depicts the number of participants and the reported types of aircraft in which the respondents have been qualified and in which they were maintaining currency. Currency is maintained by flying a given type of aircraft at least once every 60 days (Headquarters, Department of the Army, 1997). Note that many of the respondents to the survey were in a student pilot status and as such, did not report currency on any aircraft. For the purposes of this study, a student was considered current in the aircraft in which they were actively (currently) receiving training even though they were not yet qualified in a particular aircraft. Also, note that most Army pilots are qualified in helicopters only. As expected, much of the reported fixed wing experience in Figure 2 occurred in civilian recreational airplanes such as Cessnas and Pipers.

Table 2.
Military aircraft types in which qualified and current.

Type of Aircraft	Number of participants reporting as qualified to fly*	Number of participants reporting currency in type aircraft*
TH-55	30	0
TH-67	123	19
UH-1(any model)	61	8
AH-1(any model)	20	0
AH-64A	35	6
AH-64D	33	45
OH-58(A,C)	108	19
OH-58[D,D(I)]	40	51
UH-60(A,L,Q)	52	48
CH-47(any model)	40	46
Other:	14†	0

* Totals exceed 194 (the total number of participants) as over their careers, pilots can be qualified in and maintain currency in multiple aircraft types.
† Includes one report of a qualification in a military fixed wing aircraft.

Opinion Data

The remaining 11 survey items were presented in the form of statements and thus, solicited opinion-based answers from the participants. This effort was principally an attempt to collect descriptive data, therefore, the following sections include figures and narrative which describe the results. In addition, various crosstabulations were performed in order to explore associations between some of the variables. Such associations provided interesting information from which informed conclusions were made. For the purposes of crosstabulation and to facilitate data analysis, the information gathered was grouped into the meaningful groups listed below:

1. The positions/job categories were reduced to three main pilot statuses: student pilots, graduate pilots, and instructor pilots/trainers.
2. Flight experience (flight hours) was divided into the nine categories depicted in Figure 3 (1-500, 501-1000, 1001-1500, etc.).

3. Pilots' current aircraft types (those primarily flown most often) were grouped into five main categories: AH-64, OH-58D, UH-60, CH-47, and other.

Note that crosstabulations are useful for summarizing categorical variables. Following the crosstabulations, Pearson chi-square tests (tests for qualitative data expressed as frequencies) were used to test whether the row and column variables in the crosstabulations were independent of each other or not. A low significance value (below .05) indicated that there was some nonrandom relationship between the two variables. While the chi-square tests indicate that there is a relationship between two variables, they do not indicate the strength or direction of the relationship. Nominal directional measures were used to indicate both the strength and direction of the relationship between the row and column variables of the crosstabulations. The value of each directional measure statistic, the Goodman and Kruskal tau (τ), indicates the proportional reduction in error in predicting the value of one variable based on the value of the other variable. The τ statistic has a range from 0 to 1, indicating no association to complete/perfect association, respectively. All statistical analyses were conducted using SPSS® 12.0 with statistical significance set at the .05 level. (SPSS 12.0 Topics, n.d.)

Survey Statement 4

The first time I ever had to learn aircraft emergency procedures by memorizing the underlined procedural steps, it was easy for me.

A total of 42.8% disagreed with the above statement, 7.2% strongly disagreed, and 29.9% agreed or strongly agreed with it (Figure 3). This implies that a larger percentage of the total sample population did not find their first experience at memorizing emergency procedures easy.

Easy to learn EPs the first time
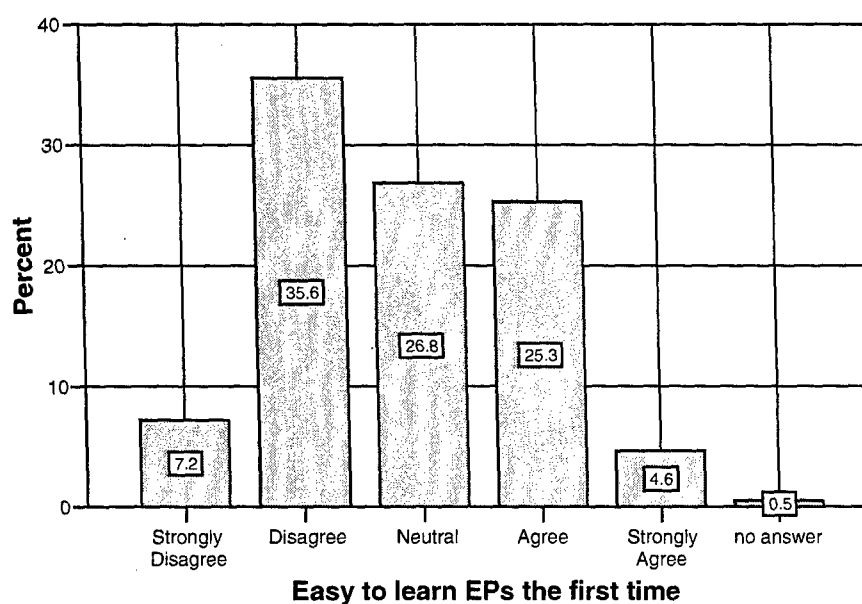
Figure 3. Answers to Statement 4 (first time learning EPs).

Figure 4 shows the distribution of the results by the participants' pilot status. A crosstabulation and chi square test of the survey results indicated that there was no relationship between the answers provided to this statement and the participants' current jobs or positions $[\chi^2 (10, N=194) = 11.297, p = .335]$. This result was not unexpected since naiveté of EP memorization requirements is common to all beginning pilots.

Learning EPs for the first time was easy
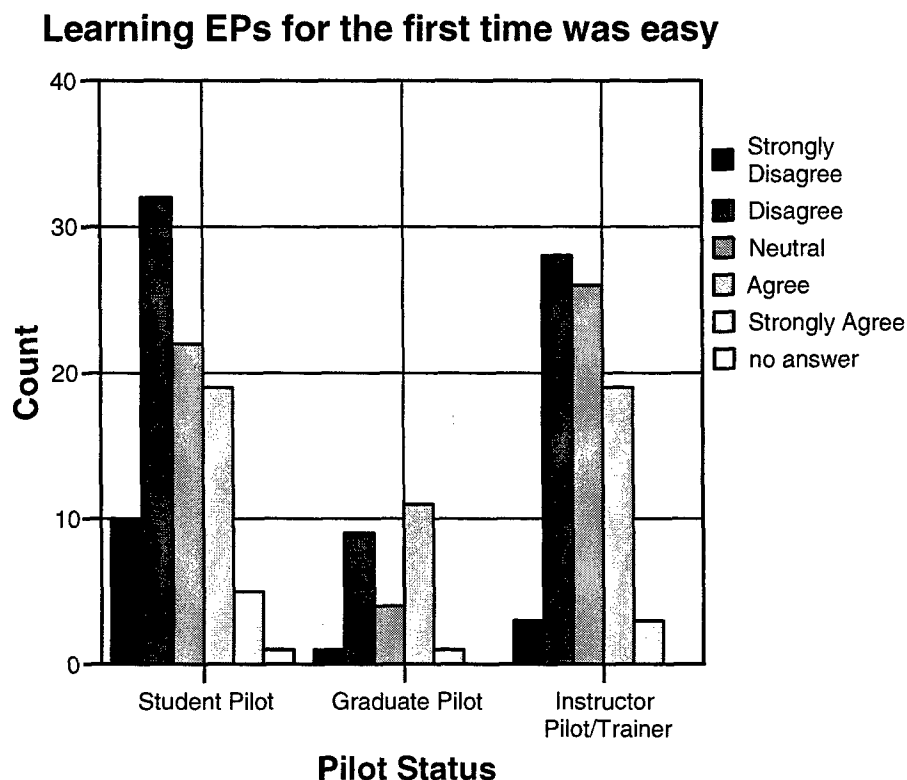
Figure 4. Answers to Statement 4 by pilot status.

Survey Statement 5

Generally speaking, whenever I have to learn new aircraft emergency procedures by memorizing the underlined procedural steps, it is easy for me.

As depicted in Figure 5, and in contrast to the answers to Statement 4, the responses given to Statement 5 indicate that memorizing subsequent procedures (after the first time) became easier for some of the population. This time a total of 39.7% (agree and strongly agree) reportedly found it easy to memorize the steps of new aircraft compared to 27.8% (disagreed and strongly disagreed). Note that over one-quarter of the sample population reportedly had difficulty memorizing emergency procedures. When the results of Survey Statement 5 were examined by flight experience using a crosstabulation and Pearson's chi square test, no significant relationship was found $[\chi^2 (32, N=192) = 34.515, p = .348]$.

Easy to learn new EPs

Figure 5. Answers to Statement 5 (learning new procedures).

Survey Statement 6

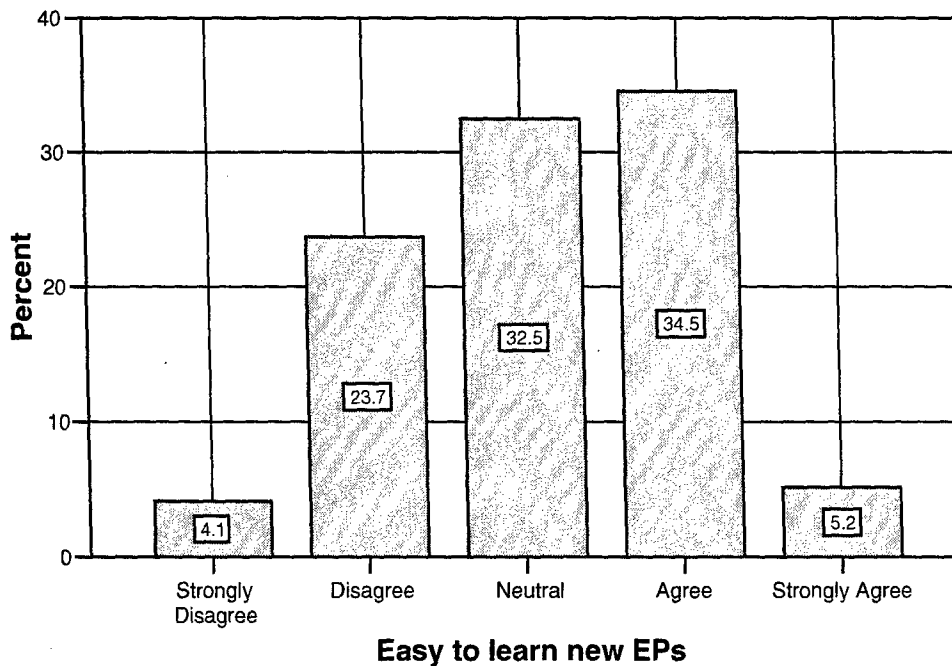**Learning the aircraft emergency procedures by memorizing the underlined procedural steps of my current aircraft was easy for me. (Specify each aircraft type and model in which you maintain currency. If more than two, refer to the two most frequently flown.)**

Recall that maintaining currency in an aircraft type requires the pilot to participate in flight at the flight controls at least once every 60 days (Headquarters, Department of the Army, 1997). Because some pilots maintain currency in more than one aircraft, Figures 6 and 7 present the responses regarding the aircraft most frequently flown by each respondent. The data indicate that most respondents (89.2%) maintain primary currency in four of the most complex aircraft in the Army's inventory: the AH-64, OH-58D, UH-60, and CH-47. These aircraft types are considered complex due to the advanced state of their cockpits and/or their multiengine designs and are listed as complex aircraft in Army Training Circular 1-210 (Department of the Army, 1996).

Similar to the answers to Survey Statement 5 above, over one-quarter of the total population (26.3%) did not agree with the statement that learning their current aircrafts' EPs was easy. However, in this case, data analyses indicated that the answers given by the respondents were dependent, albeit weakly, on the type of aircraft in which they were maintaining currency ($[\chi^2 (20, N = 194) = 38.667, p = .007], \tau = .052$). UH-60 pilots were more inclined to disagree with the statement that memorizing their EPs was easy than pilots of the other aircraft types.

8
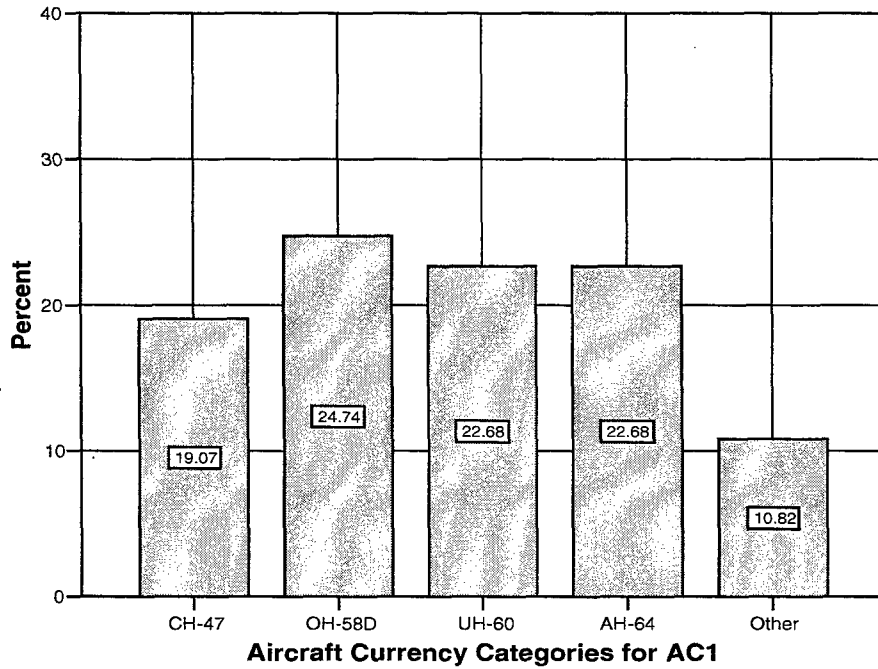
Figure 6. Type of aircraft identified as respondents' current, most frequently flown aircraft.
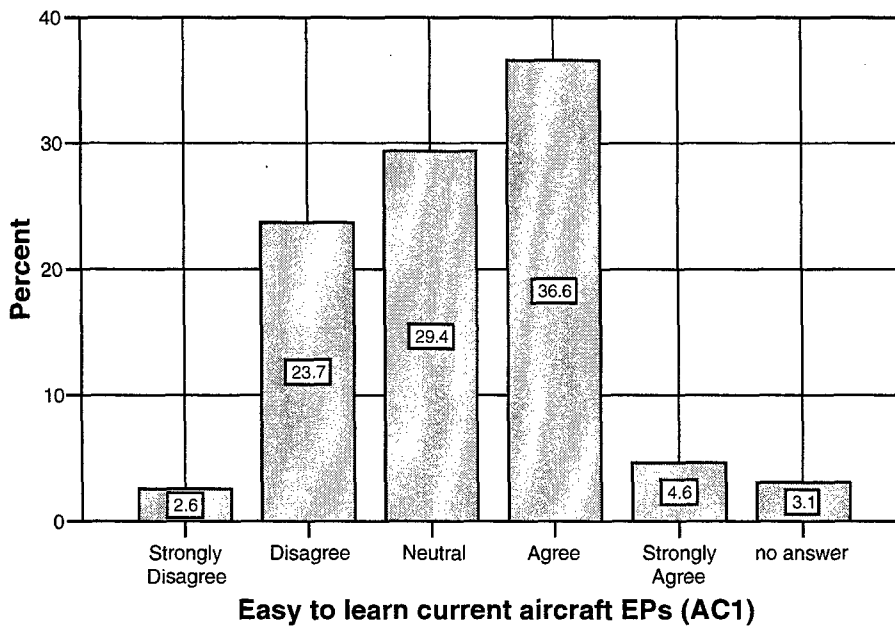
Figure 7. Answers to Statement 6 (learning emergency procedures for Aircraft 1, the aircraft most frequently flown).

Figures 8 and 9 present those data in response to Survey Statement 6 of the population reporting currency in a second aircraft. Note that only 25.3% of the sample population or 49 respondents provided information regarding a second aircraft. Unlike the situation with the primary aircraft above, there was no evidence of an association between a pilot's answer and the aircraft type flown as a second aircraft [χ^2 (16, N=49) = 10.331, p = .849].
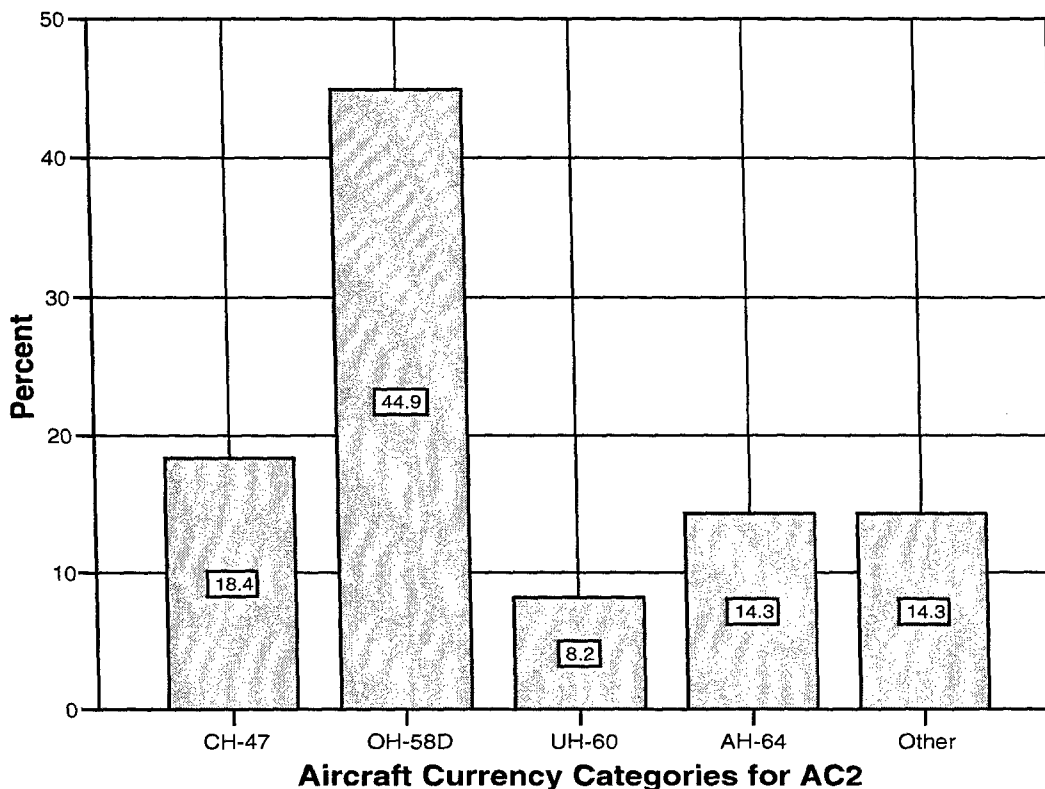
Figure 8. Type of aircraft identified as respondents' current, second-most frequently flown aircraft.

Figure 9 highlights that the respondents maintaining a second aircraft were generally evenly split: with a nearly a third (30.6 %) not agreeing, another third (32.7 %) being neutral and a third (34.7) agreeing with the statement.

Figure 9. Answers to Statement 6 (learning emergency procedures for Aircraft 2).
Note: No respondent "strongly disagreed" with the statement.

Survey Statement 7

Recalling the memorized underlined procedural steps of my current aircraft is easy for me.

This survey question was presented in an attempt to differentiate between *learning* the procedures and the respondents' perceived ability to *recall* the procedures when necessary. The data indicate that the majority of respondents (59.3%) feel that the memorized procedures for their primary aircraft are easily recalled (Figure 10). However, noteworthy, is the large population (26.8%) that is neutral on the issue and the 13.4% who don't report recall as easy.

Easy to recall EPs for current aircraft (AC1)
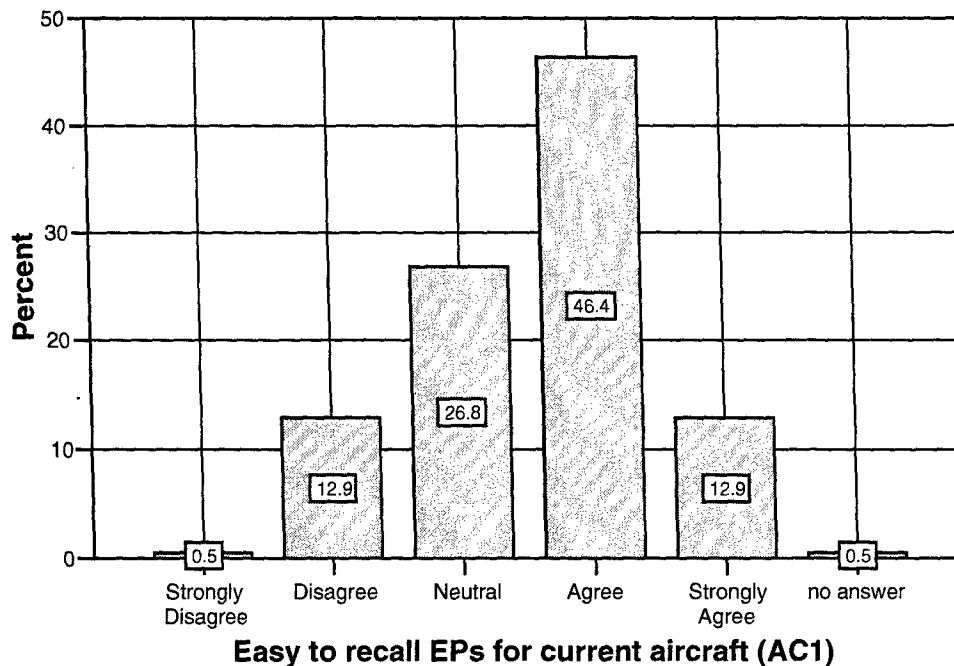
Figure 10. Answers to Statement 7 (ease in recalling emergency procedures for Aircraft 1).

Predictably, the data analyses revealed that, for the primary aircraft, recall ability is related, although weakly, to pilot status ([χ^2 (10, N =194) = 22.359, p = .013], τ = .074). According to the crosstabulation, as a group, instructors and trainers find recall easier than graduate pilots who, in turn, generally find recall easier than the student pilots. Surprisingly, however, there was no indications of a relationship between recall ease and levels of flight experience [χ^2 (40, N =192) = 29.748, p = .882].

The discovery that ease of recall was significantly, but weakly, related to aircraft type ([χ^2 (20, N =194) = 49.220, p < .05], τ = .062) is useful. The crosstabulation showed that UH-60 pilots were more likely to disagree with the statement that "recall is easy" than those flying the other aircraft types.

Regarding pilots reporting a second aircraft, the results were not dramatically dissimilar (Figure 11), however, the responses tended to shift toward less assurance of recall in general. For example, although those who disagreed with the statement remain relatively constant, the percentage of the sample groups neutral to the issue increased from Aircraft 1 to Aircraft 2 (from 26.8 to 34.7%) and those agreeing that recall was easy decreased from 59.3 to 44.9%.
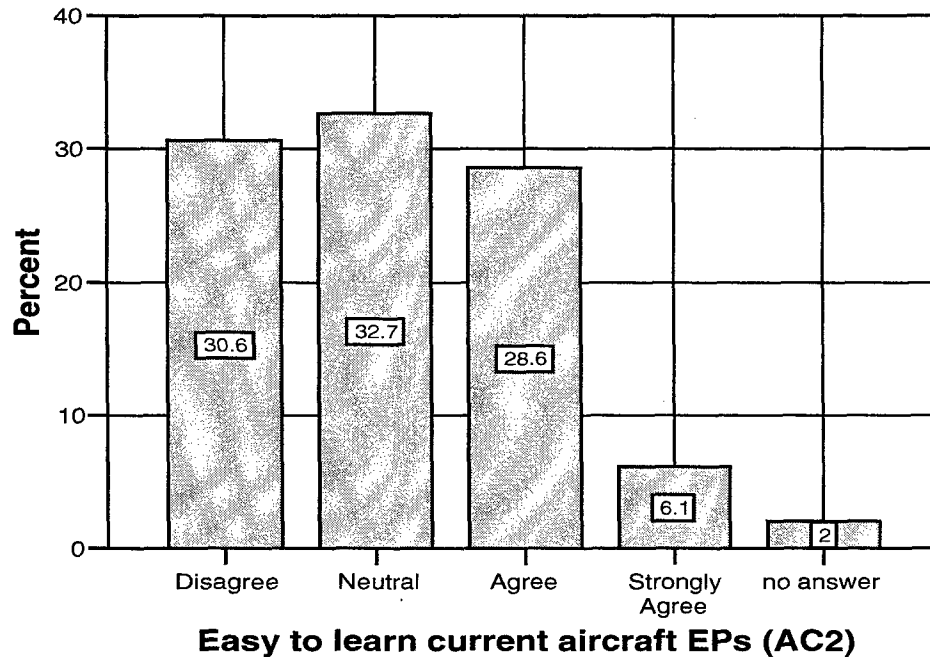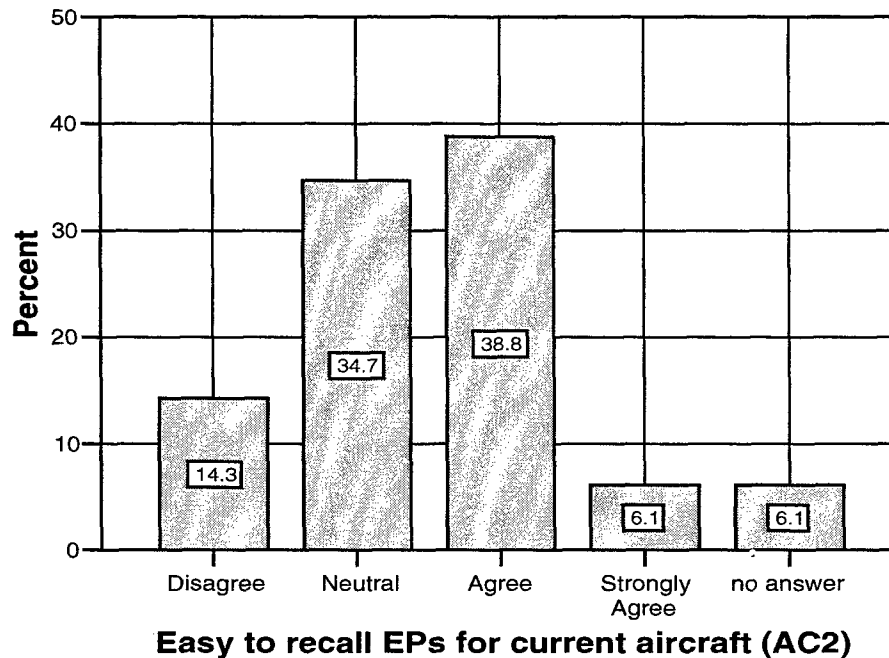
Figure 11. Answers to Statement 7 (ease in recalling emergency procedures for Aircraft 2).
Note: No respondent "strongly disagreed" with the statement.

Survey Statement 8

In order to maintain proficiency in remembering the underlined procedural steps of my current aircraft, I really don't have to study or practice reciting them very often.

The responses to this statement by the majority (68%) of the sample population indicate that "studying or practice reciting" often is necessary in order to maintain proficiency in remembering the required EP steps (Figure 12), while only 14.4% disagreed with the statement. Figure 13, representing the responses regarding a second aircraft, indicates that 71.4% find studying and practicing often necessary, with just 8.2% disagreeing with the statement.

When analysized for any relationships to aircraft type, a significant relationship was discovered [χ^2 (20, N =194) = 39.031, $p < .05$]. Table 3 presents the results per aircraft type. Note the relatively large number of UH-60 pilots who strongly disagree (14) with the survey statement and the relatively small number who agree with it compared to the responses of the other aircraft pilots. Similar significant relationships were not found for Aircraft 2 data [χ^2 (20, N =49) = 18.731, $p = .539$].

13
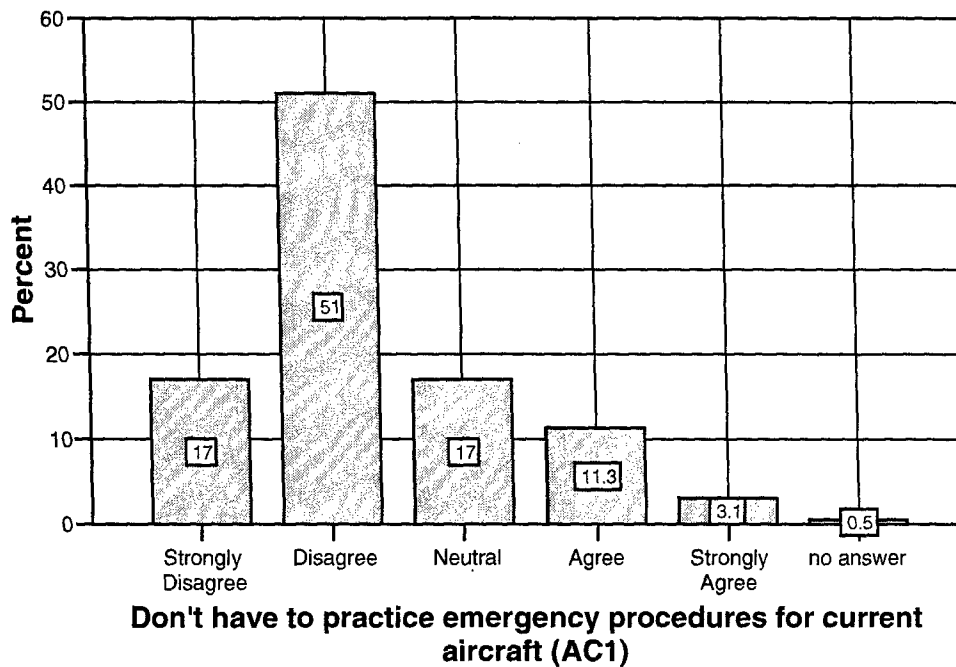
Figure 12. Answers to Statement 8 (practice reciting emergency procedures for Aircraft 1).

Table 3.
Crosstabulation of results for Survey Statement 8 per aircraft type (Aircraft 1).

	Aircraft Currency Categories					Total
	CH-47	OH-58	UH-60	AH-64	Other	
Strongly Disagree	6	4	14	4	5	33
Disagree	21	22	22	22	12	99
Neutral	5	11	5	10	2	33
Agree	5	9	0	8	0	22
Strongly Agree	0	2	3	0	1	6
no answer	0	0	0	0	1	1
Total	37	48	44	44	21	194

14
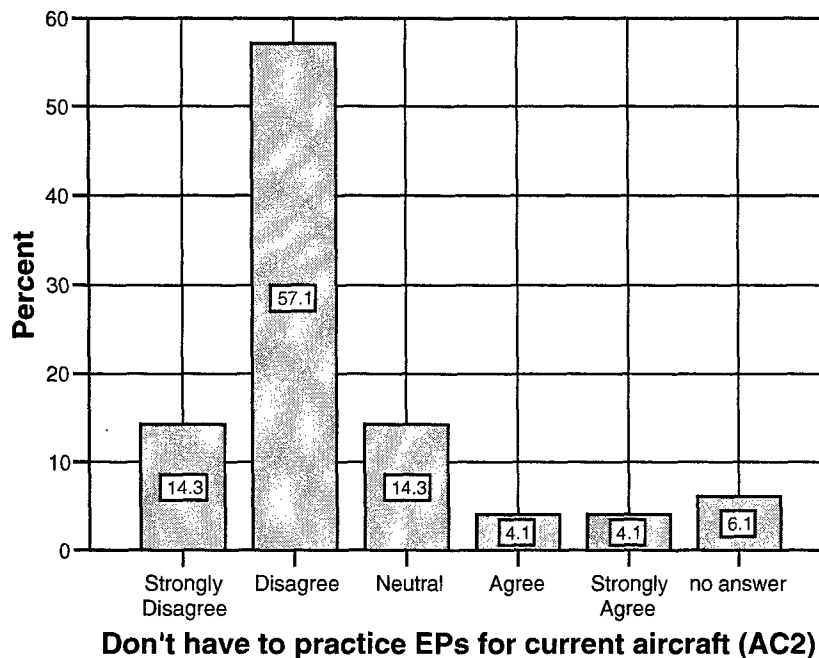
Figure 13. Answers to Statement 8 (practice reciting emergency procedures for Aircraft 2).

Survey Statement 9

Generally, I study or practice reciting the underlined procedural steps of my current aircraft about once:

The results displayed in Figures 14 and 15 show that the majority of respondents study or practice their EPs more often than once every two weeks (77.9% for Aircraft 1 and 67.4% for Aircraft 2). Interestingly, 5.2% and 18.4% (Aircraft 1 and Aircraft 2, respectively) report never practicing their EPs. Evidently, for Aircraft 1, the higher than expected number of participants reportedly never practicing resulted in a fairly weak, but significant, relationship between practice frequency and aircraft type ($[\chi^2$ (36, N =194) = 113.194, $p < .05]$, $\tau = .107$). Nine respondents of those categorized as flying "Other" aircraft (other than the Army's four most complex) reportedly never study or practice their EPs. It is possible that practicing or studying is unnecessary due to the simplicity of the procedures in their non-complex aircraft. Except for only 1 OH-58 pilot who claims to never study or practice, the vast majority of the pilots of complex aircraft report practicing at least monthly. Aircraft 2 results showed no significant relationships.

Predictably, the study and practice frequency for AC1 showed statistical significance by pilot status ($[\chi^2$ (18, N =194) = 39.775, $p < .05]$, $\tau = .133$). The crosstabulation showed that instructor pilots, in general, studied and practiced less than the populations of student pilots and graduate

15

pilots. Practice frequency had no association with levels of experience [χ^2 (72, N =192) = 75.588, p = .363]. As before, Aircraft 2 results were not significant for relationships.
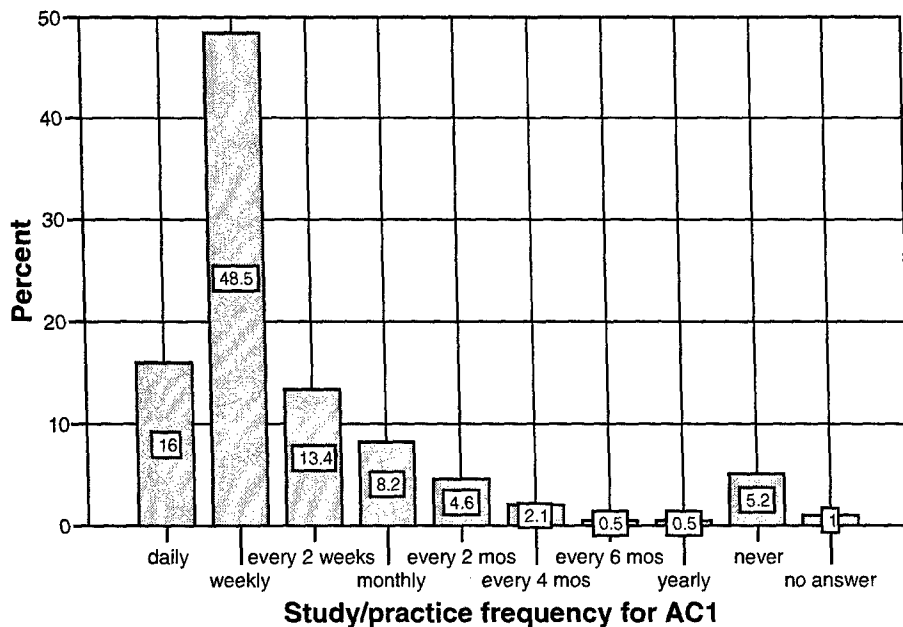
Figure 14. Answers to Statement 9 (practice frequency for Aircraft 1).
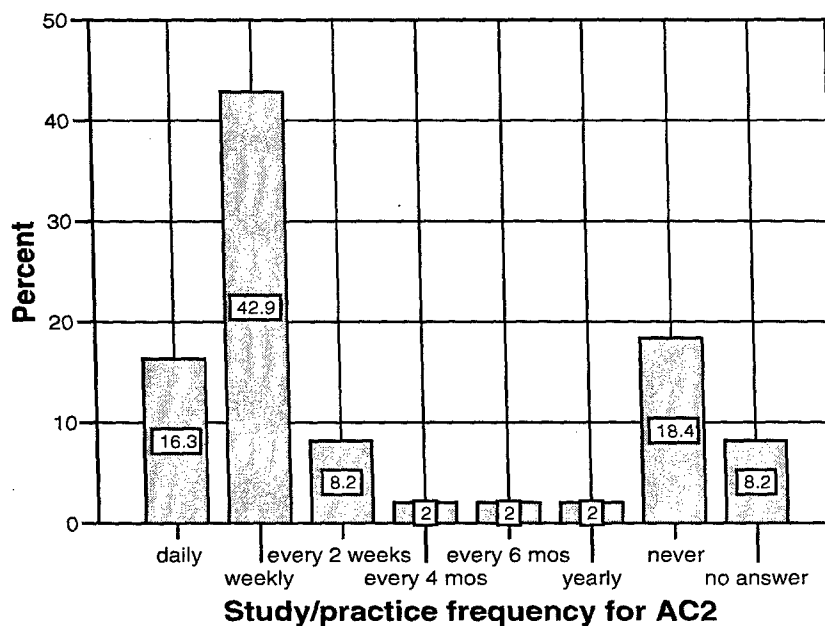
Figure 15. Answers to Statement 9 (practice frequency for Aircraft 2).

Survey Statement 10

I believe that in order for me to maintain proficiency in remembering the underlined procedural steps of my current aircraft, I really should study or practice reciting them at least once:

Similar to the responses to Survey Statement 9 above, most respondents believe that their aircraft EPs should be studied or practiced at least more often than every two weeks (Figures 16 and 17). Their beliefs, however, were not dependent on their levels of experience [χ^2 (56, $N =$ 192) = 61.161, $p = .296$], but were weakly dependent on their pilot status ([χ^2 (14, $N =194$) = 34.523, $p < .05$], $\tau = .115$) and their aircraft type [χ^2 (28, $N =194$) = 53.281, $p < .05$], $\tau = .062$). Instructor pilots, as a group, believed they needed to study or practice less often than student or graduate pilots. This position seems natural since, in the course of their duties, trainers are, in effect, practicing anyway. As for aircraft type, OH-58 pilots tended to recommend more frequent study or practice than the other aircraft pilots. The reason is not apparent.
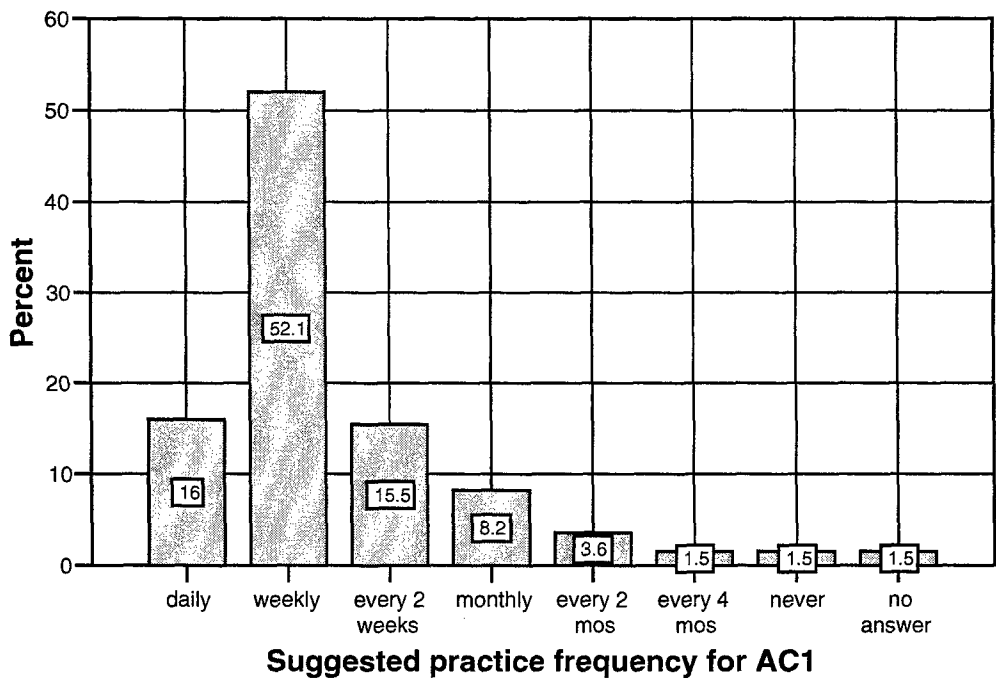
Figure 16. Answers to Statement 10 (suggested practice frequency for Aircraft 1).

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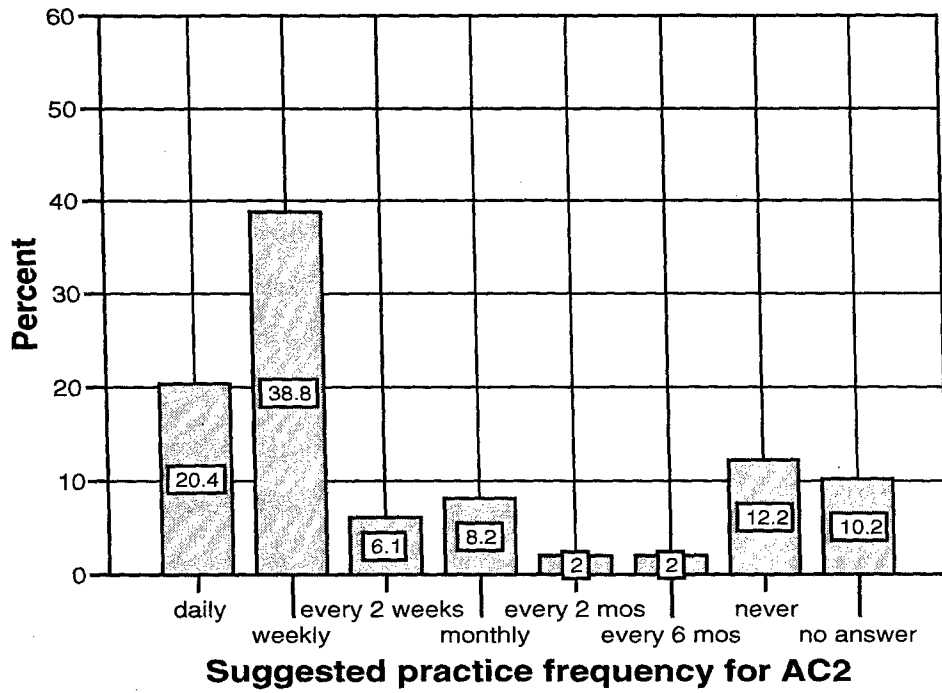
Figure 17. Answers to Statement 10 (suggested practice frequency for Aircraft 2).

Survey Statement 11

I am satisfied with the method(s) that I have been using to remember the underlined procedural steps of my current aircraft.

The responses to this statement did not show any significant dependence on, or relationship with, pilot status, aircraft type, or levels of experience based on crosstabulations and Pearson's chi square tests. Therefore, the responses of the total participant population is reflected in Figure 18 which indicates that most (76.3%) are satisfied with their own methods used for memorizing their EPs, with only 8.2% not satisfied.
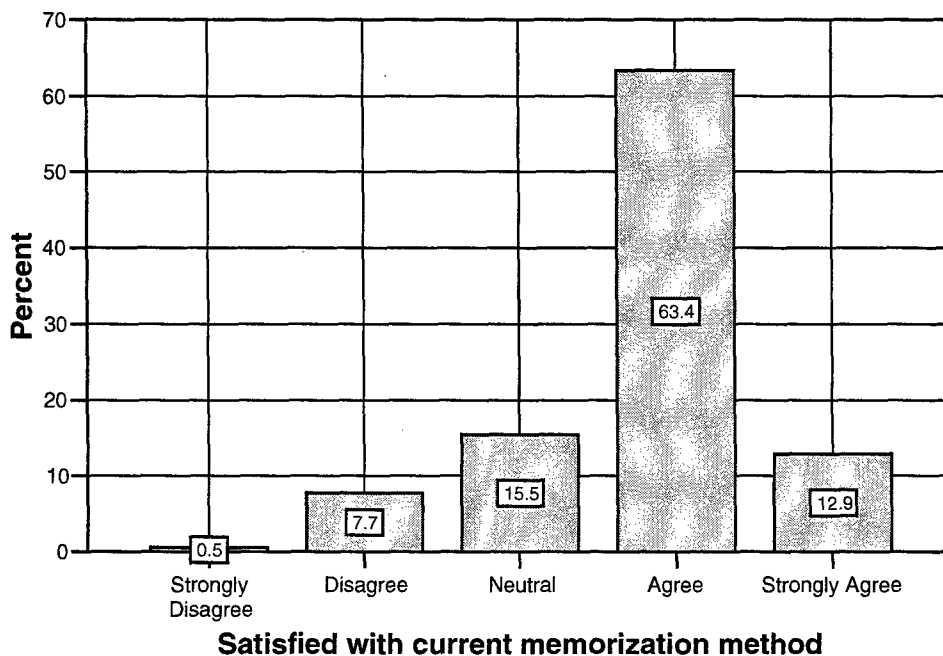
Figure 18. Answers to Statement 11 (satisfaction with current memorization method).

Survey Statement 12

I would be interested in being trained in different methods or techniques of learning my current aircraft emergency procedure steps.

Like the previous statement, the responses to this statement did not produce any significant relationships with pilot status, aircraft type, or levels of experience. Although a large percentage of the sample population (the majority) is reportedly satisfied with its current memorization method, the responses to Survey Statement 12 convey an interest by the majority (65.5%, with 18.6% *strongly agreeing*) in different methods or techniques of learning EPs (Figure 19).
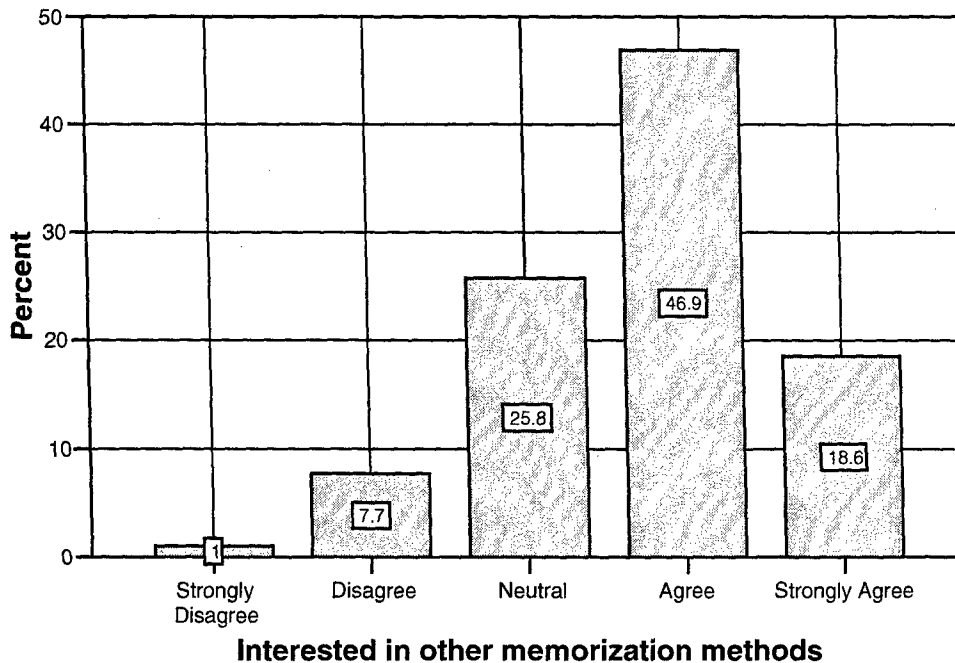
Figure 19. Answers to Statement 12 (interest in other memorization method).

Survey Statement 13

Out of all the aircraft in which I have been qualified, the aircraft that had the most difficult emergency procedures for me to remember was the: (Please specify the aircraft type and model): _____. Why do think this?_____.

Statement 13 was presented in order to attempt to identify a particular aircraft or class of aircraft whose EPs were particularly challenging to memorize. Since the overwhelming majority of the respondent population had experience in only one of the complex or advanced aircraft (CH-47, OH-58D, UH-60, and AH-64), meaningful comparisons, assumptions, or inferences were not possible. However, Appendix 2 presents a compilation of the reasons given for the respondents' subjective assessments. The TH-67 stands out primarily due to the fact that it represents the first aviation experience for many of those questioned. The novelty of having to memorize long lists of unfamiliar textual information for the first time is the apparent reason. The identification of the AH-64, OH-58, UH-60, and CH-47 as having difficult EPs to remember reflects each aircraft's complexity. Quoting one of the respondents, "More stuff = more EPs."

Survey Statement 14

I am confident that in the event of an actual aircraft emergency, I will be able to recall the immediate action steps required by my current aircraft's (s') operator's manual(s).

An overwhelming majority of the respondents (85.5%) report confidence in their ability to recall the immediate action steps (EPs) necessary in the event of an actual emergency (Figure 20). Although a very small percentage, of note are the 16 pilots (8.2%) who can neither agree nor disagree (are neutral) and the 7 pilots (3.6%) who do not report confidence in their ability to recall their immediate action steps.

For Aircraft 1, crosstabulations showed that weak, but significant relationships existed between EP recall confidence and pilot status ($[\chi^2 (10, N=194) = 29.150, p < .05]$, $\tau = .103$) and aircraft type $[\chi^2 (20, N=194) = 45.925, p < .05]$, $\tau = .040$). Not unexpectedly, student pilots were generally less confident in their abilities to recall emergency procedures.
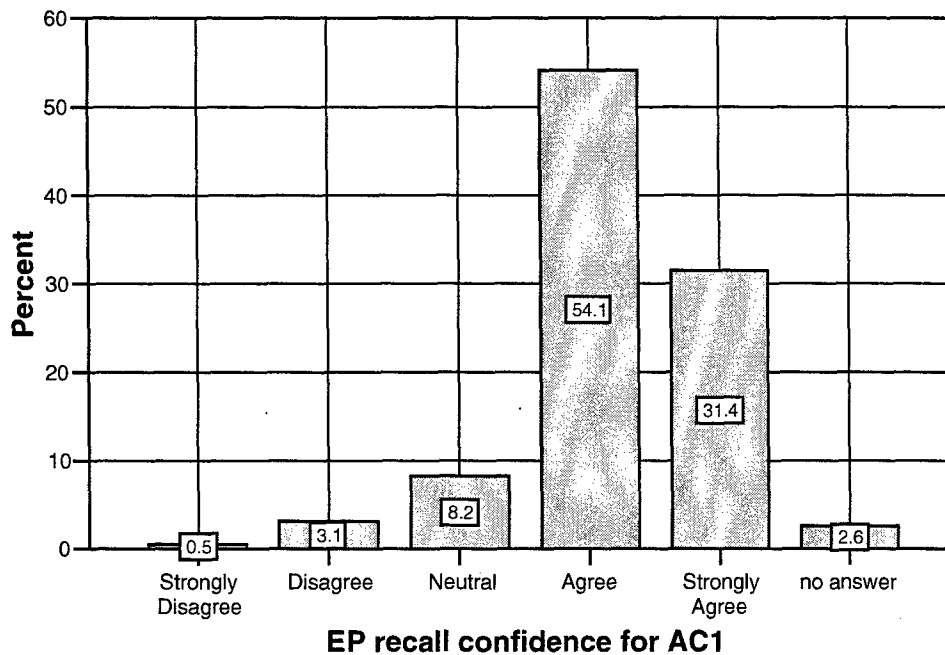
Figure 20. Answers to Statement 14 (recall confidence for Aircraft 1).

For Aircraft 2, a similar condition existed as for Aircraft 1 (Figure 21). The majority, although smaller at 63.3%, feel confident in their ability to recall EPs in an actual emergency event, while a larger percentage 10.2% disagree with having confidence in their recall ability. No significant relationships were produced for the Aircraft 2 results.
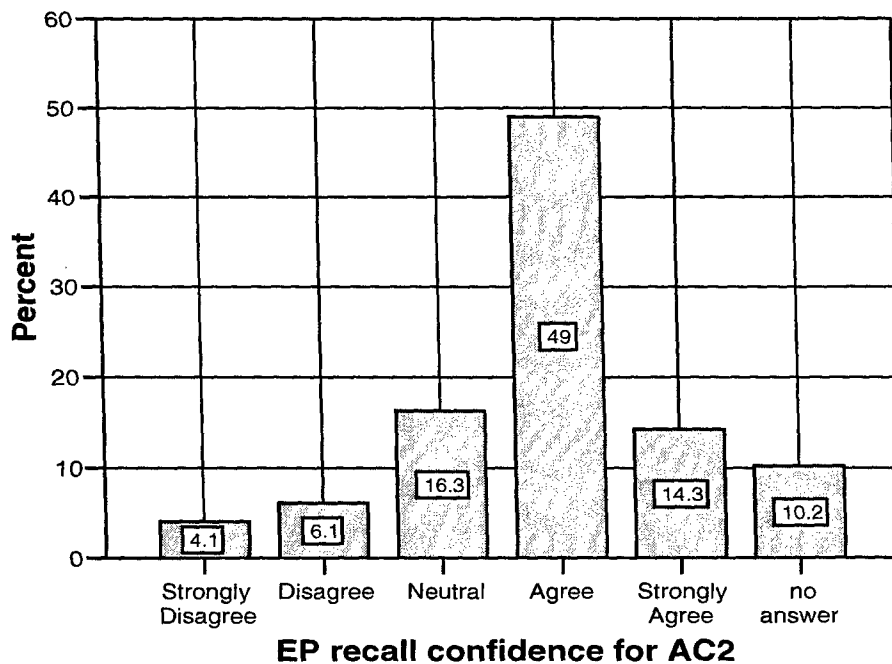
Figure 21. Answers to Statement 14 (recall confidence for Aircraft 2).

Summary of findings

1. Generally, a large percentage of the Army pilots sampled had difficulty learning aircraft emergency procedures the first time they were required to learn them.
2. Subsequent aviation experience alleviates some of the difficulties, but not for everyone.
3. Although most of the surveyed pilots considered it easy to recall memorized procedures, many did not. In general, the responding UH-60 pilots disagreed that recall was easy, compared to other pilots.
4. Most of the surveyed pilots reported having to study or practice their EPs frequently in order to maintain proficiency. The majority reported having to practice more often than every 2 weeks. The UH-60 pilots stand out as having to practice more often than the other pilots. Instructor pilots studied less frequently than graduate or student pilots.
5. Most of the respondents suggest practicing at least weekly in order to maintain proficiency. This conclusion, along with the preceding one, suggests that the current memorization methods/techniques in use are not very effective for long term information retention.
6. Although most of the sampled Army pilots are satisfied with their chosen memorization method(s), a large percentage (over 65%) would be interested in learning different methods.
7. Although most of the surveyed pilots are confident of their ability to recall EPs in the event of an actual emergency, many were not.

Conclusion and recommendation

The combined results of this survey suggest that learning and retaining aviation emergency procedures can be difficult for some Army pilots. Further research of proven and novel training and memorization methods and techniques may provide those pilots with better practices in "how" to learn and retain the required procedures.

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Appendix A.

Emergency procedures survey.

Emergency Procedures Survey
United States Army Aeromedical Research Laboratory

This 14-question survey is anonymous and completely voluntary. Please do not provide any personal information that would identify you as a participant in this survey. **Do not take this survey more than once.**

When completing this survey, think back upon your entire aviation career experience and answer based on your personal experiences only. Please do not relay the experiences of others.

1. What term best describes your current primary position or job title? **Circle only one.**

   Student Pilot   Unit Trainer

   Line Pilot   Instructor Pilot

   Aviation Platoon Leader   Aviation Staff Officer (any level)

   Standardization Instructor Pilot   Maintenance Test Pilot

   Aviation Company Commander   Aviation Battalion Commander or above

2. Please indicate the approximate number of total flight hours you have logged per aircraft category:

   Rotary wing:_____.   Fixed wing:_____.

3. Please circle the aircraft types in which you have ever been qualified (military aircraft only) and place an X over the aircraft in which you are presently current:

Rotary Wing:

TH-55   TH-1S   TH-67   UH-1(any model)   EH-1(H,X)   AH-1(any model)   AH-64A   AH64D

OH-58(A,C)   OH-58[D,D(I)]   OH-6(any model)   AH-6   MH-6   OH-8   H-500   H530

UH-60(A,L,Q)   EH-60   MH60(A,L)   MH60K   CH47(any model)   MH47(any model)

Other(s) not listed: _____.

Fixed Wing:

C-12(any model)   RC-7B   RC-12(D,G,H)   RC-12(K,N,P,Q)   C-20(any model)   C-23(any model)

C-26(any model)   UC-35A   OV-1(any model)

Other(s) not listed: _____.

Please circle only one answer per statement.

4. The first time I ever had to learn aircraft emergency procedures by memorizing the underlined procedural steps, it was easy for me.

Strongly agree   Agree   Neutral Disagree   Strongly disagree I don't remember

5. Generally speaking, whenever I have to learn new aircraft emergency procedures by memorizing the underlined procedural steps, it is easy for me.

Strongly agree   Agree   Neutral Disagree   Strongly disagree I don't remember

6. Learning the aircraft emergency procedures by memorizing the underlined procedural steps of my current aircraft was easy for me. (Specify each aircraft type and model in which you maintain currency. If more than two, refer to the two most frequently flown.)

Aircraft #1 (type and model): _____.

Strongly agree   Agree   Neutral Disagree   Strongly disagree I don't remember

Aircraft #2 (type and model): _____.

Strongly agree   Agree   Neutral Disagree   Strongly disagree I don't remember

7. Recalling the memorized underlined procedural steps of my current aircraft is easy for me.

For Aircraft #1

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

For Aircraft #2

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

8. In order to maintain proficiency in remembering the underlined procedural steps of my current aircraft I really don't have to study or practice reciting them very often.

For Aircraft #1

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

For Aircraft #2

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

27

9. Generally, I study or practice reciting the underlined procedural steps of my current aircraft about once:

<u>For Aircraft #1</u>

a day	a week	every 2 wks	a month	every 2 mos
every 4 mos	every 6 mos	every 8 mos	a year	never

<u>For Aircraft #2</u>

a day	a week	every 2 wks	a month	every 2 mos
every 4 mos	every 6 mos	every 8 mos	a year	never

10. I believe that in order for me to maintain proficiency in remembering the underlined procedural steps of my current aircraft I really should study or practice reciting them at least once:

<u>For Aircraft #1</u>

a day	a week	every 2 wks	a month	every 2 mos
every 4 mos	every 6 mos	every 8 mos	a year	never

<u>For Aircraft #2</u>

a day	a week	every 2 wks	a month	every 2 mos
every 4 mos	every 6 mos	every 8 mos	a year	never

11. I am satisfied with the method(s) that I have been using to remember the underlined procedural steps of my current aircraft.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

12. I would be interested in being trained in different methods or techniques of learning my current aircraft emergency procedure steps.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

13. Out of all the aircraft in which I have been qualified, the aircraft that had the most difficult emergency procedures for me to remember was the:

(Please specify the aircraft type and model): _____. Why do think this? _____.

14. I am confident that in the event of an actual aircraft emergency, I will be able to recall the immediate action steps required by my current aircraft's (s') operator's manual(s).

For Aircraft #1

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

For Aircraft #2

Strongly agree   Agree   Neutral   Disagree   Strongly disagree

Thank you for your participation in this survey.

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Appendix B.

Reasons given for memorization difficulty.

Aircraft	Responses
TH-67	First experience with having to learn EPs; I didn't know what I was learning until later in the course; wasn't familiar with aviation related subject; all new information with no understanding; more EPs than other aircraft; I could not visualize what my actions would be based on only words; no prior knowledge to base it on; lack of aviation experience; too wordy; didn't know what they meant; different kind of studying; never memorized EPs before – new concept; no simulator; didn't really know how to study EPs; didn't know what to expect; tail rotor procedures; new to helicopters; first time trying to understand rotary-wing theory; new environment; first time having to memorize that much material; completely foreign; because I had to learn every paragraph in Chapters 5 & 9 [aircraft systems & EPs, respectively] verbatim.
UH-1	No background in the use of some of the terms; unable to practice recall under stress of simulation; older aircraft – less standardized; new to aviation; EPs had several more steps [than now]; only flown for a short time.
AH-1	More underlined EPs, plus we had to know ALL EPs from memory (underlined & non-underlined); different logical steps & different non-standardized verbology; first mission capable aircraft; had not learned how to study all the required information; many different aircraft models in the inventory.
AH-64A	Too many steps in several EPs; first advanced aircraft; first complex aircraft; it was multi-engine and more complicated: more stuff = more EPs; the number of caution lights; there were the most; quantity – different from previous aircraft; more complicated EPs; more in-depth; underlined and non-underlined items had to be remembered equally.
AH-64D	Interference with previously learned material; more complex; complexity, number, and interference from similar aircraft; so late in my career; numerous changes to aircraft limitations and procedures; new vocabulary and more info; the most EPs; a very large amount of EPs.
OH-58AC	Single crew aircraft; new aircraft.
OH-58D	Not a lot of time to memorize them; more complex systems; more EPs to memorize; confused EPs from other aircraft with this one; more systems to fail; similarities with other aircraft procedures caused confusion/interference; steps not underlined/emphasized; keeping up with software changes; changing back and forth on EPs; procedures change often; two sets of limits at once.
UH-60	More complex aircraft; inconsistency in wording; completely new information; did not know systems well enough; new type of system - much more in-depth; not yet qualified; brand new; a lot is not memorized which adds to the confusion; EPs are not standardized and are more troubleshooting steps; unfamiliar with airframe; lack of experience; more complicated systems; there are a lot of EPs; more to know; I must know the steps for the pilot on the controls and not on the controls; many EPs were changed right after I learned them; interpretation of the EPs; inexperience with other aircraft; poor study material; you have to look for different signs per EP; many different EPs; more detail; aircraft systems intensive; the names of the components and terms used; many systems, many underlined steps that in retrospect should not be underlined; first dual engine aircraft.
CH-47	More notes, cautions, and non-underlined steps; closely related [to other aircraft]; two engine limits to memorize; there is so much more to remember and rote memorization doesn't cut it; aircraft and system complexity; number of EPs; many different systems; more EPs and several limits; some were 5-6 [steps] long; quantity of EPs; the way it was taught; multi-engine; had to memorize EPs prior to class on aircraft systems; remembering different EPs for different engines/components can be confusing.
MH-47	More EPs associated with the communications/navigation systems.