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## The Break-off Phenomenon

### A Feeling of Separation from the Earth Experienced by Pilots at High Altitude

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IT is no cause for wonder that aviators have unique subjective experiences. Moreover, it is to be expected that these experiences will change with the changing character of aviation and with differing circumstances attending flight. To keep abreast of the changing pattern of the aviator's experiences, periodic surveys are necessary. During the course of a recent inquiry, we heard pilots refer to an event in their experience by the term "break-off." This was defined as a feeling of physical separation from the earth when piloting an aircraft at high altitude. Systematic inquiry disclosed that this phenomenon is of sufficient importance to deserve investigation, and what follows summarizes our findings.

#### PROCEDURE

One hundred and thirty-seven

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Navy and Marine pilots were interviewed. All were engaged in flying jet aircraft, and their experience in jets ranged from 100 to 2,200 hours aloft, with a median of 330 hours. All had flown solo above 30,000 feet, and the great majority above 40,000 feet. Their experience in propeller type aircraft ranged from 120 to 6,000 hours, with a median of 675 hours. The median age of the group was 27.4 years.

The data were obtained by means of individual interviews, utilizing a modification of the critical incident technique described by Flanagan<sup>2</sup>. After a statement of the general purpose of the study, it was emphasized that the reports would contain only a code number for identification, and thus remain anonymous. A statement was then read defining break-off as a feeling of physical separation from the earth. The pilot was asked whether he had ever had such an experience and whether he had ever known of

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anyone else who had. If the pilot replied in the negative, a limited number of questions were asked regarding his experiences at high altitude. If the reply was in the affirmative, a description of the incident and answers to specific questions were obtained to clarify the account.

### RESULTS

A content analysis of the interviews revealed that forty-eight (35 per cent) of the 137 jet pilots reported that they had experienced the break-off effect, while only thirty-two (23 per cent) had heard it discussed among pilots. Sixteen (12 per cent) of the pilots who had not had the experience themselves stated that they had heard it discussed in conversation with other jet pilots. This makes a total of 47 per cent of the pilots who had either experienced or had heard of the break-off effect. It is significant to note that only a third of the pilots who had experienced the effect had discussed it with other pilots, and a still smaller proportion of those who had not had the experience recalled hearing it discussed. A number of the pilots stated that the experience was very personal and that it was not the sort of thing that flyers talk about. As one pilot remarked, "You don't discuss things like this." Some of them stated that they were afraid that the experience would be considered to be "corny" or "silly." This concern appeared to be justified, as shown by the statement of one pilot who had not had the experience, ". . . I haven't got that poetic yet." One of the younger pilots expressed some relief to know that some other pilots had also had this

experience. He had not heard it described by any other pilot and was very reluctant to mention it to other pilots for fear he would be considered to be peculiar.

Those pilots who experienced it characterized the break-off effect as a feeling of being isolated, detached, or separated physically from the earth. They perceived themselves as somehow losing their connection with the world. Some of the statements of pilots describing their sensations follow: "It seems so peaceful; it seems like you are in another world." "I feel like I . . . have broken the bonds from the terrestrial sphere." For some pilots this is associated with marked exhilaration, *e.g.*, "I have had the feeling of being detached . . . it's really a tremendous feeling." "I would guess that people who have these experiences really love to fly." Two others stated it this way: "In an FJ, I feel like a giant." "I feel something like a king." Three pilots reported that they felt nearer to God. On the other hand, for other pilots the reverse appears to be true; instead of exhilaration, anxiety or fear is present, but only eighteen (38 per cent) of the pilots who reported break-off explicitly expressed fear or anxiety. This is illustrated by one pilot's protocol which reads in part as follows: "He feels alone, light, remote, and insecure. He is unhappy until he gets to a lower altitude. He feels the need to have an important objective to take his mind off it." A few pilots also appear to have experiences which approach the break-off effect but have not had the typical experience. This is illustrated by one pilot who in re-

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sponse to the question stated, "No, but the connection is drawn thinner." Such persons were not considered to have experienced the break-off effect.

An additional feeling, which is commonly associated with the break-off effect but which is not considered to be a crucial factor, is loneliness. Loneliness was reported by thirty-eight (71 per cent) of the forty-eight pilots who reported break-off. Sample comments describing this are: ". . . you do have a feeling of separation and loneliness." "On instrument hops where there is little to do you get bored and lonely." "It's very lonely alone at high altitude. I'd rather fly at 20,000 or 25,000 feet . . . at 44,000 feet you are pretty lonely up there alone." Loss of radio contact with the base appears to accentuate these feelings of loneliness. On the other hand, some of the pilots reported that they never had such experiences, *e.g.*, "I do get a feeling of detachment from the earth. I never feel lonely." Two pilots who reported that they had not experienced the break-off effect did report that they had feelings of loneliness.

The reports of the break-off effect obtained from these pilots do not permit a clear statement regarding the frequency of its occurrence. This appears to be true in part because the pilots find it difficult to describe and, therefore, are somewhat uncertain about its occurrence. However, it is clear that there are wide differences among pilots and that for most of them it does not occur very often. Four pilots stated that it occurred on all flights, and one whenever he flew alone. Some pilots reported as many

as ten to twelve specific experiences, but the majority of the pilots reported either one to four experiences or would give only an indefinite number like "several."

When the pilots were asked to indicate what factors contributed to the break-off effect, a large number of items were mentioned. The most prominent factors appeared to be that the pilot was (1) alone, (2) at high altitude, and (3) not particularly busy operating the aircraft. Forty-three (90 per cent) of the forty-eight pilots who reported break-off experienced it when they were flying alone. When asked at what altitude it occurred, only thirty-three pilots were willing to indicate a specific altitude. The median of these estimates was 33,250 feet, with a range of 15,000 to 45,000 feet. Three others indicated that it occurred at "high" altitudes. The importance of high altitude is further supported by the fact that the naval pilots who flew the aircraft with the highest performance (FJ-3) reported the largest proportion of break-off experiences. The small number of pilots flying each type of aircraft, however, did not warrant statistical analysis of the data so that this must be considered to be merely suggestive. Twenty-four (50 per cent) of the pilots reported that having time on their hands with little to do was an important factor. As one pilot put it, "You get break-off when you have a chance to be free about your thoughts." Break-off does not appear to occur during tactical flights.

The weather and the type of flight were considered to be of some importance by a few pilots. Either an

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undercast or overcast appeared to be contributing factors, but fourteen pilots felt that the weather was of little or no importance, while six pilots stated that unusually good weather was an important factor in producing the break-off effect. Additional factors which were believed to be of importance by a limited number of pilots were cross-country flights, training flights, flights at maximum altitude, night flights, and flight by instruments. Individual pilots also believed that the state of health, inexperience, malfunction of the aircraft, and a long lay-off prior to the flight were factors of importance in producing the effect.

A comparison was made of the age and flight hours of the pilots who had experienced break-off and of those who had not. All of the distributions for both groups exhibited a high degree of skewness. The Mann-Whitney *U*-test<sup>4</sup> was used to test the significance of the differences between the two groups, and none of the differences was significant at even the 5 per cent level of confidence, including the following: number of hours in propeller driven aircraft, number of hours in jets, estimated number of hours flown above 35,000 feet, and the greatest altitude flown. The data appear to show unequivocally that the occurrence of break-off is not dependent on the pilot's flight experience.

Replies to specific questions related to emotional reactions were obtained from 101 naval pilots. A comparison was made of the proportion of replies for the thirty-three pilots who reported the break-off effect and the sixty-eight pilots who did not, using the test of significance of the difference

between proportions<sup>3</sup>. None of the differences was found to be significant at even the 5 per cent level of confidence. Therefore, it can be said that expressed emotion toward jet flying is not related to the break-off effect.

In order to get some notion of the pilot's evaluation of the importance of these experiences, the forty-eight pilots experiencing the effect were asked specific questions regarding its importance. In general, the pilots appeared to have even more difficulty in evaluating than in describing the effect. In response to the question, "Did your feelings help or hinder your ability to operate the plane?", 55 per cent of those answering replied, "neither," and 21 per cent felt that it helped. The remainder thought it either hindered, or had no opinion. In response to the question, "If you have experienced this more than once, do you recall any change in your feelings as you had more experience in flying?", 60 per cent reported no change, 26 per cent reported a decrease, and the others either didn't know or reported an increase in the effect. When these pilots were asked, "In your opinion should this phenomenon be described to pilots going to altitude for the first time?", their replies were about equally divided between "yes," "no," and "I don't know."

In a final question, they were asked to give their opinion regarding the over-all significance of the break-off effect. The majority of the pilots (57 per cent) felt that it was of "little" or "slight" importance in their own flying, while some (26 per cent) believed that it was of moderate im-

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portance. The remainder either had no opinion about its importance or believed that it was of no importance. In general, it can be said that although the break-off effect was experienced by 35 per cent of these jet pilots, it was not considered generally to have a significant influence on their ability to operate the plane.

### DISCUSSION

The break-off phenomenon may be defined as a feeling of physical separation from the earth. The predisposing factors have not been identified, but they appear to be related to the personality of the flyer. The cardinal precipitating factors are flying alone, at high altitude, with relatively little to do. The chief subjective feelings are those of remoteness, loneliness, and anxiety or exhilaration; there may be expressions of anxiety ranging from increased alertness to a fear of moving about in the seat. The break-off effect is abolished readily by a return to lower altitude, joining up with another plane, and oftentimes by a voluntary effort to become interested in some problem or activity associated with the flight. It is not abolished necessarily with increasing experience.

The significance of the break-off effect as a factor influencing flying efficiency is difficult to evaluate. This is true partly because the effect appears to be somewhat nebulous in the pilots' minds and partly because it is a highly personal experience, and they do not feel completely free to discuss it. In general, the pilots feel that although it is of some importance, it is not a major factor influencing flight efficiency. Only a limited num-

ber of pilots experience it often, but for some it is associated with a desire to return to lower altitudes. It is suggested that the break-off effect of itself may not be a major factor in flight to high altitudes, but that when it is coupled with anxiety and/or fear, it may have a significant effect upon the pilot's performance. For this reason, the suggestion made by some pilots, that this phenomenon be described to pilots going alone to high altitudes for the first time, appears to be valuable.

It is interesting to speculate on the importance of the break-off phenomenon at extremely high altitudes. Of interest in this connection are the reports of Bridgeman, a test pilot<sup>1</sup>. He makes several clear references to the break-off effect, although he does not use this term. These experiences are described by a man with an established reputation as an outstanding test pilot who set both speed and altitude records and who could speak of his reactions with complete frankness and without embarrassment. The following experience described by Bridgeman during a flight to high altitude falls neatly into our definition of break-off: "Fifty-nine thousand, sixty thousand, reeling off sixty-one thousand. I have left the world. There is only the ship to identify myself with, her vibrations are my own, I feel them as intensely as those of my body. Here is a kind of unreality mixed with reality that I cannot explain to myself. I have an awareness that I have never experienced before, but it does not seem to project beyond this moment. . . . And with this adrenalin-inflicted state floats the feel-

ing of detachment." If Bridgeman's experiences are typical, then the break-off effect will become increasingly important as pilots fly at increasingly higher altitudes.

## SUMMARY

Pilots of jet aircraft, when flying alone to high altitudes, have occasionally reported unusual experiences which are not encountered at lower altitudes. One of these has been termed a feeling of "break-off," or separation from the earth. The purpose of this report was to investigate the occurrence and characteristics of this break-off effect among jet aviators in the Navy and Marine Corps. Individual interviews were carried out with 137 jet pilots. A content analysis of the interviews revealed that the break-off effect is a clearly defined phenomenon, although pilots are somewhat reluctant to talk about it. It is a condition of spatial orientation in which the pilot conceives himself to be isolated, detached, and physically separated from the earth so that he is

no longer in contact with it. Forty-eight (35 per cent) of the pilots interviewed reported that they had experienced it, and that it is most frequently associated with three conditions of flight: flying (1) alone, (2) at high altitude, and (3) with a minimum of immediate activity required during the flight. A factor such as number of flight hours appears to be of little or no importance for the experience. It is suggested that although this effect appears to be a minor factor in flight efficiency, it may be of some importance in the case of individual pilots, particularly when coupled with emotional reactions toward flight.

## REFERENCES

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### The Atmosphere in Which We Fly

As everybody knows the atmosphere we live and fly in decreases in density and temperature as we go to higher and higher altitudes. Most people have had some experience at altitudes varying from sea level to about 10,000 feet if they have traveled in our western states. A much smaller number have flown at altitudes up to 25,000 feet. Only a very few of us have had any real experience at altitudes above 25,000 feet. . . . For most people, the atmosphere is taken for granted. They are occasionally reminded of its presence by clouds, wind, rain, or extremes of temperature. To another and more technical group, the atmosphere is a standardized medium with its temperature and pressure defined by a mathematical equation. Truly, it is all of these things and many more.—SCHUYLER KLEINHANS: How High Should We Fly? *Skyways*, February, 1957.