POST-FLIGHT REVIEWS IN THE ISRAEL-DEFENSE FORCE AIR FORCE AS AN ORGANIZATIONAL LEARNING MECHABISM

Presented at the 3rd International Conference on Organizational Learning.

Lancaster University, June 6th-8th 1999

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This research is partly funded by a grant from Israel’s Trustees Foundation.
Abstract

The Israel Defense Force Air Force attributes its high-level performance to systematic post-flight reviews which occasionally change standard operating procedures and doctrine. The purpose of the research is to develop an in-depth analysis of an effective OLM, the culture in which it is embedded, and the extent to which this success is localized or generalized throughout the entire organization.

We present the results of the first phase of the research which consists of semi-structured interviews of 13 pilots a squadron of F-16 fighter bombers. In this preliminary report we present our findings the different types of post-flight reviews reported in the interviews and their various learning, social control and psychological functions.
1. INTRODUCTION

Organizational learning is a process of inquiry through which organization members develop shared values and knowledge based on past experience of themselves and of others (Frieman, Lipshitz & Overmeer, in press). According to Lipshitz, Popper and Friedman (1999), organizational learning has five facets. Its contextual facet specifies five factors that determine the likelihood of organizational learning: environmental uncertainty, error criticality, task structure, proximity to core mission, and leadership commitment. Its policy facet specifies three policies that promote learning: commitment to learning, commitment to the workforce, and tolerance for error. Its psychological facet consists of psychological safety and commitment to the organization. Its structural facet consists of organizational learning mechanisms (OLMs), institutionalized arrangements that allow organizations to systematically collect, analyze, store, disseminate, and use information relevant to their own and their members’ performance. Finally, its cultural facet specifies five shared values that facilitate learning: transparency, integrity, issue orientation, and inquiry, which increase the likelihood that learning will be based on valid information and sound reasoning; accountability, which increases the likelihood that people will engage in learning and implement lessons-learned. The framework was partly derived from informal observations and anecdotal evidence regarding post-flight reviews in the Israel Defense Force (I.D.F.) Air Force (Popper & Lipshitz, 1998). In this paper we present a progress report from the first phase of a systematic study of this mechanism. The purpose of the study is to document how post-flight reviews, are performed in different flight units in the Israel Defense Force (combat planes, transportation planes and helicopters), test Lipshitz et al.’s (1998) propositions regarding values that promote productive organizational learning, and examine the extent to which the culture which characterizes post-flight reviews is (a) shared by different flight units, (b) permeates other subsystems of flight units and (c) shapes the behavior of pilots in other spheres of their lives. The following informal description of post-flight reviews in the I.D.F. Air Force, provides a good sense of the subject of our inquiry.

Every cockpit in the Air Force is equipped with a video camera that provides an on-flight record of the plane’s instrument panel. Every squadron is equipped with a special debriefing room with a comfortable chairs arranged around VCR screens. As soon as they return from an operational or a training mission, pilots grab a sandwich and head for the debriefing room where each duo or quartet who flew together run each pilot’s video film, beginning with the less experienced pilots who are more likely to have made a mistake. As the films roll the small groups dissect every significant action, focusing in particular on errors, with the mission leader (“number 1”) acting as a facilitator. In addition to discussing the films on-line, pilots earmark segments of particular interest for further discussion in the next phase of the debriefing, the squadron AAR. Next all pilots who flew on the day’s missions gather in a large room that is also equipped with several, overhead VCR screens, where they are joined by the squadron’s debriefing officer (also a pilot). For the next 45 minutes or so the entire group reviews the film segments which were chosen for general discussion in the first phase of the AAR. The discussion in both phases is thoroughly professional and issue oriented. Except for occasional jokes that alleviate the tension caused by the intense task concentration, every utterance can be mapped onto the classical problem solving phase model (i.e., identification, definition, diagnosis, generation, evaluation, and choice). Typically, the pilot who selected (his own) film for review begins by outlining the situation, pointing,
in particular to the error that he has committed (usually an inappropriate maneuver),
explaining the line of reasoning that led him to make the error, and concluding either
with a suggestion for the proper maneuver to be taken under similar circumstances or
with some more general lesson-learned such as a change in procedure or the design of
future exercises. Other pilots then join in, pointing to puzzles not noted by the pilot, or
contesting his diagnosis or suggested solution. The atmosphere is fiercely competitive,
in that no stone is left unturned, but open, cordial, and democratic. Rank does not
count; everybody feels free to comment on the pilot’s performance. “In the debriefing
room,” says one full Colonel, “everyone is equal, irrespective of religion, race, sex, or
rank.” Says another full Colonel: “During the after-action review I take criticism like
a good boy from a Captain who may debrief me. On some [training] flights I am
number one [missions leader], on others I am number four. These are the rules of the
game.” The unusual mixture of frankness, competition and cooperation can be
explained by a senior pilot’s comments to us during an interview: “On the one hand I
strive to be – and believe I can be – the best pilot in the Force. At the same time I want
my partners to be just as good as I am because, having to fly on missions with them, my
life depends on their skill as much as on my own” (Popper & Lipshitz, 1998).

2. METHOD

The first phase of the study comprised of in-depth interviews of 13 pilots in the same
squadron of F-16 interceptor/bombers. Pilots in the I.D.F. flight squadrons can be
classified into several, partly overlapping categories: veterans with up to 20 years of
service vs. young pilots still doing their compulsory service; pilots in the regular force
vs. pilots on reserve duty; pilots regular force pilots who serve in the squadron vs.
regular force pilots who serve there only during emergencies; and the squadron’s
command vs. line staff. The sample of interviewees represented a cross section of this
varied population. The number of interviewees was determined partly by the richness
of data collected from 13 informants and partly by expediency. Getting access both to
the squadron and to individual pilots was extremely difficult. Authorizing the project
required lengthy negotiations with the Air Force and actual interviews had to be
conducted, often under time pressure and disruption by other activities either at the
squadron’s fairly remote air-base or interviewee’s working places in different locations
in Israel. Furthermore, during its first year the project (which began in early 1997) was
not funded.1

Semi-structured interviews lasting between 1-2 hours were conducted the third author.
Interviews covered the following subjects (1) The after-action review process (e.g.,
“How would you describe the post-flight review process to a person who is not familiar
with the subject?”) (2) General assumptions regarding post-flight reviews (e.g. “What is
the importance of post-flight reviews? how would the squadron or Air Force look
without them?” what is the quality of post-flight reviews in the squadron? how can they
be improved?”) (3) Experiential aspects of post-flight reviews (e.g. ”What made a post-
flight review significant in your experience? Were there occasions in which you felt
that you would rather not participate in a post-flight reor in which you were satisfied or
frustrated during the process?”) (4) Facilitator/participant roles (e.g. “what does a post-
flight require of participants? What makes a good facilitator of post-flight reviews?”)
(5) The place of post-flight reviews in the squadron’s life (e.g., “Are events that occur

1 This research is currently partly funded by a grant from Israel’s Trustees Foundation.
during post-flight reviews discussed outside afterwards? Are post-flight reviews similar or different from other work-group activities in the squadron?”) (6) Culture (“Some pilots refer to a ‘post-flight review culture.’ How do you understand this concept? Does this culture characterize the squadron in general? Does this culture affect your behavior in general in and out of work?”)

Interviews were analyzed in five phases. The first two phases, top-down coding based on the protocol interview (e.g., types of post-flight reviews) and bottom-up coding based on themes which appeared in the text, produced 130 partly overlapping codes which created a hierarchical conceptual tree. Next we selected principal themes, types of post-flight reviews and functions of post-flight reviews (presented in this paper), the artistry of debriefing, post-flight review culture and the feasibility of post-flight reviews. Each theme was further analyzed by first abstracting all relevant text segments and then interpreting them by way of fine-tuned differentiation and integration (see Webb, 1982 for a similar methodology).

3. Results

The thirteen interviews yielded rich data. As analysis is still in progress, we are able to present only preliminary (and partial) results on two aspects of post-flight reviews, types of post-flight reviews and functions of post-flight reviews.

3.1 Types of post-flight reviews

Our interviewees referred to three types of post-mission reviews which are not distinguished in the informal description above: formation post-flight reviews (FPFR) and daily post-flight reviews (DPFR) which can be properly classified as OLMs and self debriefing which is an individual activity that is indispensable for the success of the two variants of group post-flight reviews, and which manifest the culture of learning in the I.D.F. Air Force.

The atmosphere in the DPFRs and the squadron command’s policy regarding tolerance for error exert strong influence in the FPFRs. In particular, the greater costs incurred by error in the daily reviews influence the thoroughness of the FPFRs which, as a matter of SOP, precede them. Indeed, according to some interviewees on rare occasions in which the order was reversed or daily post flight reviews were cancelled, the thoroughness of the FPFR notably slackened. In addition, the tolerance for error of the squadron’s command in the DPFR affects, the willingness to admit error in the relative privacy of the FPFR. While the reporting of disciplinary infractions and “near accidents” in the DPFR is obligatory, the selection of other incidents for presentation is left to pilots judgment (the two basic criteria for selection are importance and general interest). Strict punishment even of relatively minor offenses motivates pilots to “finesse” their errors in the FPFR so that these will not presented in the DPFR. A strong unofficial norm dictates that nothing should be brought up in the DPFRs unless it has been previously discussed in the FPFRs. It is fair to conclude that this norm is designed to retain the FPFR as a relatively safe environment in which pilots can shed their defenses
and expose their thoughts and actions in order to learn from their own experience and the experience of others.

### 3.2 Self debriefing

Many interviewees refer in one way or another to self debriefing either as a distinct form of post-flight review or (more typically) as a collateral process which precedes, drives, or is triggered by the FPFR and DPFR. Basically, this is a thought process driven by the logic of detection and correction of error which underlies both FPFR and DPFR that is operationalized by the three questions “What happened?” “What went wrong?” “How can we do better next time?” Different from the latter institutionalized group activities self debriefing is an individual activity that is not bound in time or place and which, once ingrained, becomes a second nature and as such, is applied in all spheres of life.

As an adjunct to FPFR and DPFR self debriefing begins as soon as the plane touches the ground (some interviewees report that they self-debrief even during flight) and may continue well after the DPFR concludes (some interviewees even claim to self-debrief in their dreams!)

To a certain extent self-debriefing is conceived as a necessary pre-requisite for productive FPFRs. Conclusions from self-debriefings serve as input for the FPFR in which, they are tested against objective information obtained from the VCR tapes and the experience of colleagues. One interviewee commented on this synergetic relationship as follows: “As a young pilot I debriefed myself so intensely that I could not care less about the FPFR and DPFR. Had I paid more attention to feedback from and learning of others, I could have been a better pilot.”

Self debriefing is virtually imprinted as an imperative in flight school where trainees are repeatedly required to debrief themselves. Those pilots who fail to acquire the critical mindset and master the art of self debriefing are labeled “story-tellers” and considered to be ill prepared for post-flight reviews inasmuch as they cannot distinguish between cause and effect and separate the grain from the chaff. Experienced pilots are expected to self-debrief their performance and pilots are partly evaluated in terms of their ability to do this well. Self debriefing is particularly important during war, when it is practically the only feasible form of post-flight reviews owing to intense operational and time pressures.

### 3.3 Post-flight reviews functions

The informal descriptions of post-flight reviews which we heard prior to our research led us to believe that, similar to all types of OLMs, their single function is to help pilots improve their performance through the correction and detection of error. There was certainly a consensus among our interviewees that this is the principal function of post-flight reviews. Nevertheless, our interviewees identified 16 distinct functions. Organizing these functions in Table 2 in three clusters reflects the fact that post-flight reviews perform simultaneously learning, managerial and social-psychological functions.

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#### 3.3.1 Learning functions
Improving individual pilot’s performance: This function is arguably the principal function of post-flight reviews. There is clear consensus among interviewees that post-flight reviews are not only essential for high performance, but that it is unthinkable not hold one after a mission: “Had I flown in the Air Force for seven years without participating in post-flight reviews I would have been a much worse pilot than I am today. There is no other way to retain pilots’ proficiency” “Skipping the review following a mission is inconceivable. It is as if you have not flown at all.” The consensus regarding the value of post-flight reviews is moderated by pilot’s experience. Veteran pilots feel that they personally profit less from the process than young pilots.

Improving coordinated formation performance: Missions are executed by formations 2-4 (and occasionally more) airplanes. As a consequence, both FPFRs and DPFRs are also dedicated to issues regarding coordination among pilots as much as to the performance of individual pilots.

Improving training: DPFRs allow the squadron command to evaluate the effectiveness of training missions. Comments raised at the DPFRs are regularly reviewed in weekly meetings where they are used as input for planning future training. An annotated summary of the comments garnered at in every squadron is disseminated throughout the Air Force where they are obligatory reading (by a “read and sign” sop).

Developing doctrine: Occasionally post-flight reviews surface problems that require making revisions either in the squadron’s operating procedures or even the Air Force’s doctrine. Depending on the importance of the revision, such occasions either lead directly to introducing the required revision or to follow-up discussion of doctrine in the appropriate forums.

Constructing valid interpretations: This function, which is a pre-requisite for successful accomplishment of all the other learning functions, deserves special notice because of its salience in the interviews. It refers to the fact that pilots necessarily form a subjective, partial and inaccurate picture of the air combat. As one interviewee noted, “Sometimes you miss as much as 40% of what had happened. Reviewing the tapes and hearing the facilitator helps you recall what really happened.”

Learning from others: Flying in formation is a group activity. It is therefore not surprising that post-flight reviews require the participation of all those who took part in the mission. The group setting helps learning directly by receiving feedback from others as well as indirectly by observing both good and bad performance of others. Learning from others entails the presence of others. The downside of this aspect of post-flight reviews is the transparency that is imposed (particularly since the introduction of VCRs). “Acknowledging your errors is very difficult, particularly for people who are very competitive as are most pilots.” Some veteran pilots note that while their benefit from post-flight reviews is marginal, their presence is important for younger pilots (and hence, the squadron) not only in terms of the feedback which they provide, but in terms of the acceptance of the inevitability of error and their willingness to confront it which they model.

Learning from errors: Although the VCR records both good and performance, our interviewees unanimously stressed that they focus on and learn more from errors. “We tend to debrief mishaps and not successes. Even after well performed missions we tend to focus on his errors. Reviews of missions which were flown with few errors tend to be shallow.” A minority of our interviewees suggest that focusing on errors has disadvantages. One pilot claims to learn more from his successes than from his failures. Several others suggest that recognizing the achievements of one’s colleagues promotes not only learning but one;s sense of self efficacy and group cohesion.
3.3.2 Social Control Functions

Account giving: While the FPFR constitutes a relatively safe environment in which the detection of error is designed to promote learning, error has very different, namely disciplinary, consequences in the DPFR. The surfacing of error entails both formal (e.g. fines) and informal (i.e. loss of face) sanctions. Our interviewees recognize the adverse effects of the aversive consequences of the detection of error on learning. Nevertheless, they recognize that some errors must be punished in order to retain rigor and discipline in the hazardous task of combat flying. In addition to the structural solution for alleviating this tension, i.e., the dual mechanism of FPFR and DPFR, we identified a normative solution i.e., the values transparency and integrity, and a policy solution, i.e., tolerating marginal errors and errors which are committed for the first time on the one hand, and punishing disciplinary infractions and repeated errors on the other hand.

Supervising pilot’s performance: In addition to fulfill the squadron command’s need to learn about the performance of individual pilots which is served by the DPFR, both FPFR and DPFR fulfill pilots’ need to learn about the performance of one another “so that we can know whether we wish to team up with them, or how much to trust them in the air.”

Delivering messages: The DPFR enables the squadron’s command to inform pilots of policies, intentions and vision. This is done mostly indirectly, through its reactions to occurrences during missions, what – and how – it sanctions both positively and negatively, and what – and how – it chooses to emphasize in the DPFR. The importance of implicit messages is illustrated in the suggestion that “If a squadron’s command emphasizes the bottom line results this tends to raise competitiveness among pilots – all means become legitimate to achieve this end. Focusing on the process does not trigger competitiveness to that extent.”

Socialization: An important aspect of socialization is the inculcation of values that characterize the social group into which one is being socialized. The socializing function of post-flight reviews is indicated two ways. Firstly, learning to self-debrief has a general influence on pilots’ mindset: “When I was young I used to do sea surfing. I would catch a wave, fall, and try again automatically, without reflection. Now each time that I fall down in ski lessons I ask myself what did I do wrong and how next time can I do better?” Secondly, some veteran pilots define their role in post-flight reviews as that of educators: “As a veteran I allow myself to give young pilots feedback on their personal behavior. There is no need for to comment on their task performance – others usually have done that already. So I talk about other issues, professionalism, learning to learn, self discipline and integrity.”

3.3.3 Psychological Functions

Social comparison: Post-flight reviews provide an opportunity for satisfying the basic human need of locating oneself relative to relevant others. “During post-flight reviews it is easy to observe to whom other people listen respectfully, or who causes the commander [who customarily sits in the front row] to turn back and listen when he speaks from the back of the room. “You can see that sometimes people are happy that others have failed because that makes them look better.” Interestingly, the process of social comparison is deliberately used in the choice of facilitators. “A junior pilot who happens to be responsible in the squadron for a certain [technical] subject should facilitate post-flight reviews of missions having to do with that subject. How else can he acquire an authority in the subject?”

Acquiring recognition: Acquiring recognition by means of positive self presentation is closely aligned to social comparison, as it is intended to create a positive image of
oneself among relevant others. Post-flight reviews offer an arena for self presentation: “Some people do their utmost to make sure that their tapes are shown in the DPFR if they have scored a “down” so that all the tribe will know about it.”

Involvement and participation: In addition to involving pilots in the evaluation of their own and their colleagues’ performance, post-flight reviews enable them to provide input into the training program of the squadron and change its doctrine and sop.

Catharsis: Combat flying is an intense, energy consuming and mentally exhausting activity, particularly in the competitive culture of the squadron. Although post-flight reviews are not, by any means, a relaxing pastime, they offer an opportunity to unwind and bring the mission to closure: “The post-flight review is essentially a ritual, the tribe gathering around the fire at the end of the day swapping stories, exchanging information, showing off one’s own achievement and playing down the achievements of others.”

“Character building”: Notwithstanding the emotional undertones of the cathartic process, explicit emotional expression is not normative in post-flight reviews. To the contrary, pilots are expected to accept frank and sometimes withering criticism of their performance in a cool, “professional” manner. Although no direct is made between learning to withstand the stresses of the post flight review and learning to withstand the stresses of battle, some reviewers clearly hint at that “Pressure is part of what is required of a fighter. Civilians may find the constant pressure for high, really perfect performance, intolerable. But that is precisely what is required of pilots, to perform under pressure be it in the post-flight review, in combat, or as prisoners of war.”

4. References


Table 1

Attributes of Formation and Daily Post Mission Reviews

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<thead>
<tr>
<th>Attribute</th>
<th>FPFR</th>
<th>DPFR</th>
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<tr>
<td><strong>Description</strong></td>
<td>Performed by 2-4 pilots who flew in the same formation. Facilitated by the formation leader pilots critique the video recordings of their performance and select material to be further reviewed in the DPFRs.</td>
<td>Attended by all pilots who flew missions during the day and the squadron’s command, and facilitated by one of the commander’s deputies by a veteran pilot.</td>
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<tr>
<td><strong>Principal Functions</strong></td>
<td>Evaluation of performance and flagging of problems and areas for improvement. Improving pilots’ performance at the individual level. Improving pilots’ performance at the formation level.</td>
<td>Informing the squadron’s command on the squadron’s performance. Informing the squadron’s command on the performance and behavior (e.g., disciplinary problems) of individuals. A platform for the squadron’s command to send messages regarding broad policy, SOP, standards of performance and norms of conduct. Providing input for changes in doctrine and regulations. Collective sharing of and learning from the experience of others. An opportunity for rewarding or reprimanding individuals in public. An opportunity to “show off” to others. An opportunity to confront and discuss problematic issues in public.</td>
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<tr>
<td>Attribute</td>
<td>FPFR</td>
<td>DPFR</td>
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<tr>
<td>Role differentiation</td>
<td>Rank is largely ignored. The only meaningful differentiation facilitator (i.e., inquirer) vs., participants is also fuzzy since facilitators’ tapes are also examined.</td>
<td>Attention of squadron’s command focused on formation leaders. Younger and some of the regular force pilots suggest that DPFRs mostly serve reserve and emergency-stationed pilots who need it owing to their intermittent presence in the squadron.</td>
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<tr>
<td>Substantive focus</td>
<td>Thorough discussion of technical details and individual errors. What had “actually happened” based on objective information (VCR) and opinions of others. Fine-grained analysis of causes of error.</td>
<td>De-emphasis of “what had actually occurred;” strong emphasis on “how things should be done.” De-emphasis of individual level performance; strong emphasis of squadron level performance. Although there is an attempt to review all formations, thorough discussion of particular issues valued.</td>
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| Atmosphere | Intimate, frank, tolerant of error.  
> “We are all in the same boat.”  
> Participants, including the facilitator, flew in the same formation, are familiar with its particular conditions, may have committed identical errors, and share responsibility for the formation’s performance. | The presence of the squadron’s command is clearly felt.  
> Errors of individual pilots are used to send messages to others in order to promote learning, competitiveness, and setting boundaries.  
> Loss of control over the public exposure of error which is an unpleasant experience that participants would rather avoid and which they must learn to face.  
> A mixture of seriousness and comradeship.  
> Occasionally characterized by boredom and uneven participation. |
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<td></td>
<td>High involvement of all participants.</td>
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| Skills required for effective facilitation | Professionalism (a good facilitator is a good pilot but not vice-versa); the ability to communicate with and relate to other participants.  
FPFRs are regarded as more effective means for improvement. | Professionalism, (the ability “to separate the grain from the chaff”), charisma and showmanship (i.e., the ability to hold participants attention).  
Facilitating DPFRs is more difficult as it requires fast analysis of VCR tapes and quick identification of “match points” in missions flown by others (i.e., without the benefit of one’s own participation.)  
Effective facilitation requires thorough preparation (in short notice) by collecting information from mission plans and formation leaders to find a significant focus. |
Table 2

Functions of Post-flight Reviews

<table>
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<tr>
<th>Learning Functions</th>
<th>Control Functions</th>
<th>Psychological Functions</th>
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<tr>
<td>Improving individual pilot’s performance.</td>
<td>Account giving.</td>
<td>Social comparison.</td>
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<tr>
<td>Improving training.</td>
<td>Delivering messages.</td>
<td>Involvement and participation.</td>
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<td>Constructing valid interpretations.</td>
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<td>Character building.</td>
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