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Facing Human Workload: the Resilient Ego: a Psychoanalytic Point of View

Glauco Maria Genga

Maria Gabriella Pediconii

Facing Human Workload. The Resilient Ego: a Psychoanalytic Point of View

Glauco Maria Genga, Maria Gabriella Pediconi

Abstract. The paper aims to show new connections among Human Factors, Human Workload and Resilience. We intend: 1) to highlight the role of subject in facing the human workload, inflected as demanding tasks and emergency situations; 2) to show how psychoanalysis can provide novel insights, not only into human errors, but also into human resilience. They have a common denominator, at least in part: the role of subjective contributions even in demanding situations. Human workload includes a work for satisfaction.
We recall also the case study of US Airways Flight 1549 water landing (the so called "Miracle on the Hudson"), which shows how the resilient Ego never works alone, but as a part of a team.
Finally, A case study report will also be presented, including the first hypotheses of a pilot study on the mental life of firefighters. The resilience, supported by subjective mental work, could confirm the role of the resilient Ego as a promoter of Human Factors. Most of analysis and researches call in cause the Ego only like a source of errors. Our contribution can introduce and analyze the subject as a source of adaptive solutions and even successes also within the harder missions. The role of psychoanalysis in interpreting human performance, particularly in the emergency situations, could open new interpretative into a so very important field of Human Factors.

Keywords: Human Factors, Mental Workload, Resilience, Reliability, Psychoanalysis, Errors

1   Introduction. Human Factor, Workload and Resilience: New Connections.

"The paradox of automation is that it often lowers a pilot's workload when that load is already low. And it sometimes increases the workload in the cockpit when it is already high (…) Technology is no substitute for experience, skill, and judgement."
(Sullenberger&Zaslow, Highest Duty, 2010)

We begin with a well-known plane crash: the commercial flight Pacific Southwest 1771, December 7, 1989. The aircraft, a BAe 146, carrying 43 people, crashed into a rural area in California at a speed higher than that of sound. The investigation discovered that it was a murder-suicide operated by David Burke, a pilot from the same company, who had just been fired for stealing money from the cto of the same Company.

   "At that point, the CVR recorded the cockpit door opening and Flight Attendant Deborah Neil telling the cockpit crew, 'We have a problem!'. Captain Lindamood

replied, 'What's the problem?'. A shot was heard as Burke shot the flight attendant dead, and announced 'I'm the problem.' He then fired two more rounds. Most likely, he shot the pilot and copilot once each, incapacitating them, if not outright killing them. Several seconds later, the CVR picked up increasing windscreen noise as the airplane pitched down and accelerated. The remains of the flight data recorder (FDR) indicated Burke had pushed the control column forward into a dive.

A final gunshot was heard followed not long after by a sudden silence…There was some speculation that Burke shot himself, though this seems unlikely, because a fragment of Burke's fingertip was lodged in the trigger when the investigators found the revolver, which indicated that he was alive and holding the gun up until the moment of impact."[1]

Let us dwell on the mocking phrase, 'I am the problem'. It does not correspond to the action that he was making, the massacre. In that situation, Burke's Ego was not really the problem, but rather the enemy, which is quite different. However, it reveals something about the act he was intending to accomplish; in order to harm himself, he harmed everyone! And shortly before, he had in some way 'confessed' his intentions, addressing his superior Raymond Thomson, who was responsible for his dismissal and on-board the same flight. "Hi Ray. I think it's sort of ironical that we end up like this. I asked for some leniency for my family. Remember? Well, I got none and you'll get none." This message was written on an airsick bag.

"We worked for all three earthquakes, Amatrice, Camerino and Norcia.[2] We just collected corpses. When we broke that wooden panel and we found ourselves in front of those three children embracing each other, we looked and understood each other right away: these angels will repay us for all the dead! And being a firefighter is the best job in the world!" The author of the article added: "Even now he recounts that, Marco Filabozzi is on the brink of tears, because saving Ludovica, Edoardo and Samuel, buried under the avalanche that engulfed the Rigopiano Hotel, is something that marks you forever. "Even if we had won the World Cup, we would have been less happy", the firefighter said. But Marco was not alone, because saving lives is not a job that you can do by yourself. All of the teams from Lazio, Pisa and Torino USAR (Urban Search And Rescue) were with him, including the Canin Units too. All together, each one with his own task...The two boys exchanged a 'five' with the firemen. "Now that you are out, we all go to the cinema to see *Moana*." "Wow!". Then the three children asked for water...They remained so, suspended for a few seconds. Their adrenaline went straight down. The firefighters looked at each other:

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[1] See: *Mayday Air Crash Investigation S11E10 I'm The Problem.*
[2] These are the little towns that have been affected the most by the earthquakes that have occurred in Italy from August 2016 to today.

"This will remain within us forever. We started crying like babies. And you should know, we are people who, in 20 years, have seen of all sorts of things…"[3]

These statements refer to the collapse of the Rigopiano Hotel (province of Pescara, Italy) that took place January 18, 2017. It is part of the rescue report of a terrible and very different tragedy from that of the PSA flight 1771.

We are struck by the statement of the rescuer: "Being a firefighter is the best job in the world." How can he say and think that? However, without that view, perhaps that rescue operation would not have taken place. People often consider firefighters as heroes, idealizing them. Nevertheless, if we reflect carefully, many of them do not see themselves as heroes. Thus, could there be a secret to their success?

These two examples are only seemingly contrastive and appear to be incongruous with each other. However, an observation centered on the role of the subject in facing demanding situations can lead us to note more in both cases. In the first case, we see an unpredictable homicidal/suicidal act that produces an unpredictable massacre at the hands of one man. In the second example, a few subjects are faced with an equally unpredictable event, produced by nature, which has affected dozens of people who are in dire need of rescue. In addition, the individual in the first case provokes an imposing destruction, however, in the second case the individual contributes in a decisive way for the success of the rescue intervention.

Both cases are connected to the aim of this paper, which is to highlight the role of the subject in facing the human workload, intended as demanding tasks and emergency situations. The aim of the paper will be enlightened by psychoanalysis as an approach that can provide novel insights, not only into human errors, but also into human resilience. A case study report will also be presented, including the first hypotheses of a pilot study on the mental life of firefighters.

Psychoanalysis provides a different yet intriguing perspective in order to recognize the role of the Ego in facing human workload. In particular, our work aims to highlight the two sides of the 'ego component' in a critical scenario of safety. On the one hand, it approaches the subjective component as a problem, while on the other it looks at it as resources.

In this work, we intend to highlight subjective mental life and creative reasoning as a resource in facing the human workload. We will investigate links between individual feelings and thoughts and the work of an emergency team, within and beyond the limits of intervention instructions and guidelines.

We will briefly review the elements of the notion of Human Factors as a topic of increasing relevance, questioning not only specialists in the involved disciplines (from engineering to psychology, law and institutions up to ergonomics and design), but everyone in the population at large (Genga, 2012, 2014; Mantovani, 2000).

Our interest also arises from observing that scientific research in this area so far has focused mainly on the study of stress and reactions to it, as demonstrated by the existing literature in emergency psychology. "Every emergency is by definition a

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[3] The 'heroes' of Rigopiano: 'Those children embraced, the best thing'. Title of the following article: http://www.ansa.it/sito/notizie/cronaca/2017/01/22/gli-eroi-di-rigopiano-quei-bimbi-abbracciati-cosa-piu-bella_5cb16b32-69c2-4cd9-8a9a-8103a1941d85.html

stressful situation, which can lead to chronic stress conditions or turn into an intense but enriching experience" (Sbattella, 2009, p. 73). Sbattella reviews studies on operators' reactions to emergency in detail, from the early studies concerning the effects of the Hiroshima bomb, to the more recent events, showing that "only a few of the firefighters who worked in the rescue operation following the attack of Oklahoma City had symptoms of post-traumatic stress disorder" (Sbattella, 2009).

At best, on the one hand, the Ego is indeed a source of error, but on the other hand it becomes an adaptive resource, even unforeseen (Reason, 1990).

In the first case, the Human Factor concerns the danger, the errors and the probability that a hazard will occur. It is an integral part of the man-machine interface. In the second, it is a valuable resource and cannot be eliminated. It has to be favoured when human work takes place within complex systems, even beyond the procedures already organized and codified.

In order to characterize our topic, we will briefly outline some important related definitions.

«Human factors refer to environmental, organizational and job factors, and human and individual characteristics, which influence behaviour at work in a way which can affect health and safety.»[4]

Our matter in question is typical within the field of cognitive ergonomics, which studies mental processes, such as perception, memory, reasoning and motor response, as they affect interactions among humans and other elements of a system.[5] Mental workload, decision-making, skilled performance and human reliability are considered the main aspects involved in each human-system experience.

«Workload can be characterized as a mental construct that reflects the mental strain resulting from performing a task under specific environmental and operational conditions, coupled with the capability of the operator to respond to those demands». (Cain, 2007) Most researchers agree that although mental workload is a concept that has intuitive meaning, it is difficult to define. In this direction, the contribution of psychoanalysis could be useful to specify the subjective components of mental workload.

Resilience is «the process of coping with disruptive, stressful, or challenging life events in a way that provides the individual with additional protective and coping skills than prior to the disruption that results from the event. » (Richardson et al., 1990, p. 34)

This paper aims to show new connections among Human Factors, Human Workload and Resilience. They have a common denominator, at least in part: the role of subjective contributions even in demanding situations, in which person-system and technical-system could be parallel.

According to Freudian discoveries, life events - either stressful or challenging, even at risk - provoke the competence of the Ego in facing them. We would like to outline how, in lot of cases, the Ego is not merely a source of errors, but also an

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[4] See http://www.hse.gov.uk/humanfactors/introduction.htm
[5] See http://www.iea.cc/ International Ergonomics Association

adaptive subject: a source, time after time, of unknown but effective solutions. This is our meaning of a *resilient Ego*.

To show the contribution attributable to the Freudian study of the Ego and its functions, we consider the essay *The Ego and The Id* (Freud, 1923). In it, Freud describes very well how the Ego depends on both the external reality as his/her own desires, without ever losing the position of mediator. Freud uses the expression 'Ego dependencies'. This relentless work of the Ego is not simple, as it has to deal with different types of errors:

1) Errors due to environmental stress and in general to the inevitable limitations imposed from the outside world. In this case, the Ego is mediating between his/her own desires and external reality. The issue becomes very complex and delicate if we consider the case in which the external reality includes complex and automated systems. Among the many examples of this type of error, we recall the famous Three Mile Island case. The design of the control room of the nuclear power plant was "so poorly designed that error was inevitable: design was at fault, not the operators" (Don Norman, 2013, p. 7).

2) Errors in which a psychopathological component is present. They are often due to neurosis, which is the most common form of psychopathology. They are illogical errors, of which the subject may be only partially aware, resulting in damage, which he/she causes first of all himself/herself, through inadequate behaviour for the purpose or task that he/she should fulfil. In this case, the Ego depends on another instance, which Freud called Superego. It is a source of illogical and rigid commands, often misunderstood with traits of the ego-syntonic personality (precision and thoroughness). Basically, it is something that does not allow one to work willingly and with satisfaction. As Norman recalls, "We have to accept human behaviour the way it is, not the way we would wish it to be." (Norman, 2013, p. 6) Sometimes engineers, responsible for the design of automated environments, are surprised that individuals can make mistakes so much and so often. But even this source of error is a reality.

3) Finally, there is a third type of act, which we cannot properly call errors: the deliberate violation of norms and rules. In the error literature, deliberate violations "tend to be ignored. In the accident literature, they are an important component" (Norman, 2013, p. 169). They stand out because they are potentially harmful to the entire community, as in the example given at the beginning of this paper. Norman reports the example of going through a red light: "because no other cars were visible and I was late". It is a crazy behaviour, a crime, which unfortunately will never be reduced to zero.

Nevertheless, Freud never abandons the Ego: both in his theoretical and clinical work, he tries to support the subject in anyway.[6] On one hand, he precisely describes the pathological conditions, however, on the other, he does not renounce the concept

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[6] See also Contri G.B.: *Il profitto di Freud*, in M.G. Pediconi (edited by), *Una logica chiamata Uomo. Uomo versus Narcisismo*, Sic Edizioni, 2014

of normality: "In every field of human endeavor, there are great men that perfectly meet the requirements of normality." (Freud, 1930, pg. 41)[7] Therefore, we can see how human or mental workload includes an effort for satisfaction, and how reliability can be considered an inherent feature in the definition of normality and one facet of HF.

In addition to this, we do not intend to ignore that the individual's reliability is a very controversial issue in the study of Human Factors. On the contrary, we wish that the multidisciplinary discussion, in this regard, does not miss anything, not even the aspects in which researchers have not reached a common point of view.

2 Subjective Constituents of Human Factors in Facing Human Workload

«Human factors refer to environmental, organizational and job factors, and human and individual characteristics, which influence behaviour at work in a way which can affect health and safety». (HSE, *Introduction to human factors*) This definition includes three interrelated aspects that must be considered: the job, the individual and the organization.

- About the *Job*, HF includes: the nature of the task, workload, the working environment, the design of displays and controls and the role of procedures. Tasks should be designed in accordance with ergonomic principles to take into account of both human limitations and strengths, both physical and mental. Mental aspects would include perceptual, attentional and decision-making requirements.
- About the *Individual*, HF includes: his/her competence, skills, personality, attitude, and risk perception. Individual characteristics influence behaviour in very complex ways. Some characteristics such as *personality* are almost fixed; others such as *skills and attitudes* may be changed or enhanced.
- About the *Organization*, HF pays attention to work patterns, the culture of the workplace, resources, communications and leadership. Such factors generate significant influences on individual and group behaviour.

Ergonomics aims to match the demanding work with the limitations and strengths of human beings. This paper points out the importance of subjective aspects for facing human workload. Paradoxically, we cannot exclude the case of a subject who is strong and talented yet is devoted to criminal objectives.

On the one hand, "Human factors are concerned with what people are being asked to do (the task and its characteristics), who is doing it (the individual and their competence) and where they are working (the organization and its attributes), all of which are influenced by the wider societal concern, both local and national. On the other hand, we see HF in action if these aspects are not considered in isolation, but

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[7] Our translation.

included within a good safety management system, able to be examined in a similar way to any other risk control system." (HSE, *Introduction to Human Factors*)

If we consider the work on human error in the field of risk analysis in different technological systems (transport, industry, health, etc.), an increasingly popular instrument is the *Bow-Tie Analysis*.[8] It takes into consideration not only the cause of the action, but also the possibility of preventing and/or mitigating it, if not avoiding their effects.

Fig 1. A Bow tie scheme

In this image (presenting a general example of a Bow Tie scheme[9]) we have:

in the center (red circle), the event you want to study (for example: a dangerous product is released because of a defect, the nurse gives someone the wrong medicine, the pilot sets a flight altitude that would crash the plane...).

On the left (blue boxes), all the reasons that can lead to the event (the pilot wants to commit suicide, the labels on the medicine containers are poorly written, a pipe in the plant is corroded ...) are listed. The white rectangles placed between the cause (blue) and the event (red) are the barriers that are placed to avoid the occurrence of the event (the psychiatric examination, the co-presence of more pilots in the cabin, the procedures for the correct preparation of labels, periodic checks for corrosion...).

[8] We wish to thank Eng. Giovanni Maria Uguccioni (Milan) for the useful advice he kindly gave us.
[9] Source: Rausand, Marvin. *Risk Assessment: Theory, Methods, and Applications*. Hoboken, NJ: John Wiley & Sons, 2011.

Similarly, on the right, all the scenarios that may result from an event are listed (for example, the plane crashes or is forced to make an emergency landing, a patient dies or is subjected to gastric lavage, in a system there is a fire or a gas leak...). Similarly, all the barriers that, if the event happens, avoid a particular scenario are pointed out (for example, should the pilot set a wrong altitude, the system corrects it automatically, or if a hazardous product is released, an active emergency system activates, etc.).

This scheme allows to think about the sequence of events and to identify the barriers, if any. Otherwise, it clearly highlights critical sequences where no or few barriers are present. This model is also used to calculate the probability of the different final scenarios, introducing chances of success at every barrier.
A critical issue is how to assign a probability to a human error. The various methods in use, from the most basic to the most complex, work by identifying the factors that can lead to an error (stress, insufficient training, etc.), varying from 4 factors in the simpler models, to tens of factors for the most complex models. Weights have to be assigned to the various factors, combining them to obtain an estimate of the probability of error.

Also used is the so-called *Fault Tree* model, created and applied mainly to technical systems but also put to use for human error, as in the following example:
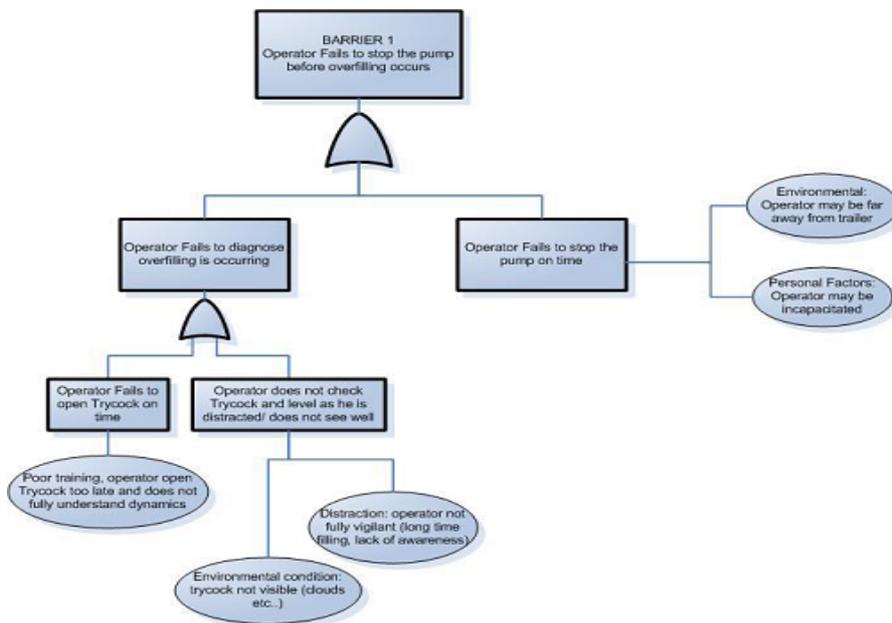

Fig. 2 the causes of an event give rise to intermediate events.

The diagram shows how the causes of an event (the ellipses), combining with each other, give rise to intermediate events (rectangles) via Boolean Logic Gates, namely the AND/OR operators. In this example, logic gates are all the OR type. The tree is used to identify all the combinations of events that cause the error to occur and to calculate the final probability of the event (the top rectangle) with simple formulas.

The theme of Human Errors contributes to this study as one of the causes of an accidental event; therefore, the barriers that may prevent the error from developing have to be identified (usually technical barriers, but specific training, etc., can also be considered). This is what is done in the risk analysis of systems. Other techniques are used to analyze the operators' behaviour in daily operations (*Behavioural Based Safety*): they are designed to achieve the most efficient training.

In this regard, it is very useful to reread the aforementioned book by D. Norman (2013) *The Design of Everyday Things*.[10] The author reviews and adheres to a critical view of the many defects and design errors of the most diverse objectives.

In particular, the works of Kahnemann and Tversky allowed us to distinguish the nature of subjective errors and recognize the heuristics which underlie our actions (Kahneman&Tversky, 1979; Tversky, 1982).

More concisely, we can say that the study of Human Factors is the study of the reliability of man in relation to the reliability of machines.[11] However, we must keep in mind that the term "reliability" is used here in two different contexts.

The difference between "reliability" when dealing with machines and humans is in the voluntary actions, which are intrinsic in human behaviour: the English language accurately distinguishes two terms for events that are due to voluntary or accidental actions:

- *Security*, or protection from attacks, assaults or damage to persons or property, caused deliberately by individuals or groups;
- *Safety*, or protection from events or circumstances that are accidental, independent from will and have a high, harmful potential.

Even if it is true that human behaviour can never be isolated from other parts of a system, the risks of technological malfunctions are one thing, and human error another.

The most recognized models in use today (systemic-cognitive) start with the analysis of the events, even when they are produced by human subjects. In fact, we have observed that in the list of causes of the *Bow-Tie*, different kinds of events can appear, some of which are attributable to the acts of individuals, while others are not. Therefore, a psychodynamic analysis could be applied to the subjective conditions

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[10] This book has not lost its appeal. The psychologist Cesare Cornoldi writes, within the presentation of the Italian translation, that this book is "a contribution to the wide-ranging study of the psychological significance of major part of everyday life (the other big event is *The Psychopathology of Everyday Life*, by S. Freud)". Our translation.

[11] Among the precursors of the Human Factor study, we remember the Italian Agostino Gemelli (1942), for having introduced the concept of applied psychology, first in the Italian Air Force, then in other workplaces.

that have produced a certain error: the links between failure, guilt and reliability will bring something new to the field of Analysis of Human Errors and will lead to the abandonment of the use of the cause-effect relationship scheme that is too general.

We aware that the consideration of human reliability is only one facet of human factors and, in addition, one that is very contested. In this regard, it is useful to mention Reason's distinction between the person-approach and the system-approach. Reason (1990) distinguishes between active and latent human failures and proposes a general framework for understanding the dynamics of accident causation. «Such problems can no longer be solved by the application of still more 'engineering fixes' nor are they amenable to the conventional remedies of human factors specialists. Further improvements in reliability will require more effective methods of risk management. These, in turn, depend upon acquiring a better understanding of the breakdown of complex socio-technical system and the development of new techniques of risk assessment…There is a growing awareness within the human reliability community that attempts to discover and remedy these latent failures, which will achieve greater safety benefits than will located efforts to minimize active failures. So far, much of the work of human factors specialists has focused upon improving the immediate human-system interface» (Reason, 1990, p.28). Focusing on reliability allows us not only to distinguish people as the source of error from people as an adaptive resource but also to promote structural features of "high-reliability".

The individual aspect of HF, considered not only as a source of errors but as an adaptive and even creative resource, is conceivable based on the studies and research on *Mental Workload*.[12]

Even though Mental Workload is a peculiar concept that has an intuitive appeal, it remains difficult to attain a clear definition. Researchers continue to debate over definitions to this day, and it's impossible, at the moment, to obtain a universal agreement between disparate statements about MW. We can only recognize the main commonalities among the various interpretations, by means of the analogy often made between mental and physical load, based on two components: stress (i.e., task demands) and strain (impact on the human). Even the international standard on mental workload (ISO 10075) depends on the conceptual couple stress/strain. «Demands (stress) can have multiple facets, such as time, pressure or task complexity. There may also be different kinds of resources available, as in other team members or technological support to cope with demand. Finally, the trade-off between stress and strain may have different effects on the human, as measured by the different objectives (task performance, physiological) and subjective metrics» (Young, 2014, p. 5).

We have to consider that stress consists of multiple demand factors, and strain shows multiple expressions depending on the resources available. Those who explain

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[12] See F. Nachreiner, *International Standards on Mental Work-load. The ISO 10 075 Series*, Industrial Health 1999, 37, 125-133

MW in terms of demand/resource balance, offer an attractive and realistic approach to this multidimensional construct.

When demands exceed capacity, skilled operators modify their strategy to compensate, in order to avoid the degradation of their performance. Demanding situations can be analyzed in order to measure the adaptive competence of operators, also in term of *resilience*.

Among psychologists, resilience is referred to three general meanings: good developmental outcomes despite high risk status; sustained competence under stress; recovery from trauma (Fleming and Ledogar, 2008). Luthar (2000, 2006) called resilience a construct with two distinct dimensions: significant adversity and positive adaptation despite adversity. As a consequence, researchers claim that resilience is never directly measured, but only indirectly inferred from evidence of connected dimensions. They insist that the process of resilience is related to a given context, domain and age. Context involves social/environmental conditions and culture, which will determine if a factor is protective or not.

Ungar explained that resilience is «a multidimensional construct, the definition of which is negotiated between individuals and their communities, with tendencies to display both homogeneity and homogeneity across culturally diverse research settings» (Ungar, 2005, p. 219). In reference to the possibility to measure resilience, Ungar argues that qualitative methods are especially relevant. He stated that they are: «well suited to the discovery of unnamed processes; they study the phenomenon in very specific contexts, their trustworthiness strengthened by the thickness of the description of that context; they elicit and add power to minority 'voices' which account for unique localized definitions of positive outcomes; they promote tolerance for these localized constructions by avoiding generalization in favor of transferability; and they require the researchers to account for the bias inherent in the social location» (Ungar, 2005, p. 86).

Among the subjective constituents of human factors in facing human workload, resilience shows, in a very impressive way, the role of Ego as an adaptive resource. In this regard, our paper could strengthen the concept of resilience thanks to the Freudian doctrine. Among psychologists, resilience is referred to as the possibility to overcome stressful situations with less damages possible. Freud's approach gives us the possibility to compare resilience with the process managed by the subject to overcome the mourning event. *Mourning and Melancholia* (Freud, 1915) describes the subjective faculty to start investing thoughts and affections in external reality again after having experienced mourning. This kind of work does not merely aim to limit damages, but to also obtain new opportunities. On the one hand, the work of mourning is more than adaptive, it is creative. On the other hand, each mourning, however painful, is still a normal experience, not necessarily destined for melancholy, nor for what nowadays is called depression. Resilience resembles what Freud called "working through": when the Ego comes to light after mourning, he is a *resilient Ego*.

3 A Resilient Ego between Errors and Heroes. The Case Study of *Sully*

In this paragraph, we will address the US Airways Flight 1549 water landing (the "Miracle on the Hudson", January 15, 2009), well known thanks to the recent movie *Sully* [13] and the interesting book written by Captain Sullenberger (Sullenberger&Zaslow, 2010).

Our intention is to regard it as a case of the resilient Ego, and we will report some thoughts on it.

1. Capt. Sullenberger has repeatedly stated that he is not a hero, as he did what any experienced pilot would have done in his place. It was something that had to be done. This is correct. Civil and military pilots manage their daily work year in and year out without becoming particularly exceptional or recognized characters. They are just like Capt. Sullenberger... until the day of the spectacular landing. Sully states that he had always planned to lead an ordinary life, between work and family, and that he had never sought after what is called 'visibility': a factor of the psychic normality of this man. Incidentally: the statements of the co-pilot Lubitz (Germanwings disaster, April 29, 2015), reported by the media in the aftermath of the massacre, are of the opposite content. From the news during those days, we learnt that Andreas Lubitz had said to one of his ex-girlfriends: "One day all will know my name".

2. When Kelly, Sully's daughter, still very young, asked him "What's the best job in the world?", he answered her: "It's the job you would do even if you didn't have to." This phrase contains a very good description of what reliability is. It deals with the vocation, or in other words, the pilot's mission: life's crucial choice.

3. Capt. Sullemberger has a correct conception of the man-machine interaction. He quotes a remark by one of his colleagues, E. Wiener, Ph.D. (whose he was an admirer), who had told him about "a forum in which another speaker's topic was 'the role of the pilot in the automated cockpit.' When it was dr. Wiener's turn to speak, he noted, wryly but rightly, that the session should have been called 'the role of automation in the piloted cockpit." (Sullenberger, 2010, p. 188) It follows a rational valuation for improvisation, not to succumb to the temptation to overvalue the procedures. There is an awareness that not all possible experiences have already been known, analyzed and domesticated. The case in which a flock of birds puts out both engines in a matter of seconds during take-off had never occurred until January 2009. Skills and knowledge, also called 'airmanship', come into play.

4. He attributes a great importance to the diligent and incessant study of prior cases (accidents, disasters, terrorist attacks, etc.). Since its beginning, the flight

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[13] Movie *Sully*, 2016.Directed by C. Eastwood, written by Todd Komarnicki, starring T. Hanks, WB Pictures.

experience continually calls for the most recent updates, something similar to the jurisprudence in the field of law.

5. He even reached a solid judgment facing his father's suicide: another peculiar step on his personal journey to resilience. In the book, he does not hide this fact, even though today it could be a questionable matter. Some psychiatrists would consider this a kind of stain in his "psychological *pedigree*". On the contrary, he shows great independence of judgment in reference to the father figure.

6. The investigation carried out by NTSB (although in the film it suffers a narrative distortion to some extent) culminates in a very informative way. This is a summarisation of the scene from the film: Capt. Sullenberger, after viewing the simulations, criticizes such methods and results, providing a good explanation of what "Human Factor" means. The pilots involved in the sims had been instructed to carry out the return operation to the airports, immediately after the impact with the birds. Nevertheless, "Sully" had to analyze the situation - a very critical instantaneous workload - and decide which was the best choice. He needed 35 seconds to do that. Introduced to the same amount of time, the same sims necessarily hesitated in a crash. At last, investigators are satisfied (the viewers breathe a sigh of relief), and tell Sullenberger that, in such a dramatic event, he himself was the X-Factor, congratulating him. In turn, Sully responds negatively, saying that he does not agree: "It wasn't just me, it was all of us. And that's why we survived". These are words to ponder over carefully: the resilient Ego never works alone, but as a part of a team! That's exactly what happened on that day in the NYC sky!

4 Resilient Ego at Work. A Pilot Study About Subjective Mental Supporting for Resilience Within a Team of Firefighters.

Despite the fact that the concept of resilience is rather complicated and deep in content as well as quite complex for an assessment and measurement, increasing research on resilience in extended contexts and dimensions is being carried out. (Bahmra&al., 2011; Lisniak, 2015)

As we claimed in the previous paragraph, we consider resilience as one of the aspects of the subjective mental workload. Although the quantitative methods remain privileged in the field (Bakker&al., 2007; Herbst&al., 2014; Estes, 2015), a qualitative data collection involving field operators could benefit this kind of work and help to elicit workload aspects related to the subjective side, both in positive and problematic terms.

What we are about to present is a pilot study that aims to measure the resilience of rescuers involved in rescue operations in term of perceived mental workload and subjective mental supporting of them.

The rescue operation is configured as a defined unit of time and space, strongly characterized by a demand for highly specialized tasks that often affect the survival of the rescuers and/or others. Often, the time factor is decisive with respect to the success of the operation. The short time available and the specialization of the

operations characterize the rescue operation as a situation in which both high mental workload and mental supporting of adaptive mental supporting are experienced. Peculiar mental contents can characterize rescue events, but we need to collect data in order to suggest further interventions, measures and ideas for fostering an environment of resilience within a fire department.

Focusing on mental contents that foster the development of increased self-efficacy, increased social support and flexible and accurate thinking habits allow us to discover what the subjective factors that promote success in the management of risks are.

The sample of our research will be a team of firefighters, composed by people typically engaged in relief operations in which individual skills and teamwork coordination are decisive in order to obtain the maximum efficiency of operations.

In particular, we will explore which kinds of mental contents accompany individual relief operations, using time-units of 24 hours. In this way, we can explore both the contents when awake and any dream content during sleep.

The contents will be examined both by means of self-perception and narrative storytelling. The study will be conducted as a qualitative analysis of semi-structured interviews. Based on the interviews, the mental contents will be considered in terms of: rescue operation elements (risk factors, the team, the victims involved, the duration, required performance); memories and feelings; images and fantasies; night dreams. Next, we summarise our main hypotheses:

H1 *Realism*. The presence and the intensity of subjective mental work, signaled by mental contents (images, memories, feelings, night dreams), supports the prudent/thoughtful perception of risk factors concerning rescue operations. We call this aspect a sort of realism in facing the risks.

H2 *Openness*. A peculiar subjective mental work, signaled by mental contents (images, memories, feelings, night dreams), which supports the positive perception of team work.

H3 *Fortitude*. If H1 and H2 are positive, the workload improves as well.

H4 *Supported resilience*. In correspondence with the positive influence of subjective mental work on the aspects explored in H1 (risk perception), H2 (perception of team work) and H3 (perception of workload), the subjective mental work plays a proactive role in order to develop resilience. In this way the explored aspects (Realism, Openness, Fortitude) can be considered factors of resilience.

Our path suggests an analysis of connections among human factor, mental workload and resilience inspired by the psychoanalytic point of view. In particular, Freudian discoveries have helped us to focalize the importance of contributions of single individuals even in harder conditions: it was with this aim that we recalled the case of *Sully*. It is not difficult to observe that the emergency teams, who we have often learnt about through the daily news, are composed of individuals who have to manage risk conditions and have to be ready for this special aim. A firefighter's team is a team of this kind: for their characteristics and their specific profession, the firefighters are a privileged sample for our research project.

In the course of doing their jobs, firefighters experience very intense situations, both related to emotions and feelings and also to professional and specific tasks (Setti et al., 2015).

On the one hand, the difficult situations met in their jobs challenge their behavioural and mental health, but on the other hand, their behavioural and mental health can be seen as a favourable condition and even as a resource during specific operations.

Our psychological approach, based also on psychoanalytic discoveries, suggests a more proactive analysis on the development of resilience skills, in order to discover how the individuals prepare themselves to resist the strong and even negative effects of stressful events and situations and support their overall personal well-being (Grant et al., 2014; Deppa et al., 2016). We find resilience in thinking and coping skills that are employed on the job as well as at home and in other circumstances (Malaguti, 20015; Rozenfeld, 2014).

Resilience, supported by subjective mental work, could confirm the role of the resilient Ego as a promoter of Human Factors. Most analyses and research consider the Ego only as a source of errors. Our contribution would like to introduce and analyze the subject as a source of adaptive solutions and success, even within harder missions. The role of psychoanalysis in interpreting and influencing human performance in work systems, and particularly in emergency situations, could offer a new interpretation to the very important field of Human Factors.

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