



A REVIEW OF BASIC PSYCHOLOGICAL THEORIES AND THEIR APPLICATION IN MARITIME HUMAN ELEMENT TRAINING

Octavian Postolache*

Abstract. The science of Psychology aims to explain the nature of human behavior and thoughts. In the maritime industry, its principles are used to optimize human activity and to avoid accidents, particularly when it is required by the shipboard personnel to acquire soft skills in addition to technical skills. The purpose of this article is to connect the objectives of the Bridge and Engine Resources Management course with the knowledge and understanding of the basic theories in psychology explaining how the human mind works. The author reviews the syllabuses taught in the General Psychology courses at the undergraduate level at the University of Montreal and Laval of Canada, Farleigh Dickinson University from New Jersey, Capella University, Minneapolis and University of North Dakota of USA, and University of Paris City, Bucharest, Gothenburg, Split and Cardiff from Europe, makes a brief résumé of the basic theories on the human mind and how individuals behave, and presents them briefly in a comparison with the learning objectives of the IMO Model Course 1.22 Bridge Resource Management and IMO Model Course 7.17 Engine Resource Management. The author finds that the different soft skills required by the STCW Code may be better understood by the trainers and better explained to the students by using one or all the following basic psychology theories: psychoanalytical theory, the behaviorist and cognitive approach, humanism, and biological psychology. Considering this new approach in teaching BRM and ERM courses, the author suggests that the use of Psychology should be applied in the study of the maritime Human Factor with the aim of creating a dedicated Marine Psychology science.

Keywords: Soft Skills; Human Element; Human Factor; ERM; BRM; Maritime Psychology.

Ecole Nationale Supérieure
Maritime Marseille, 39 Avenue
de Corail, 13008, France

* **Corresponding author:**
octavian.postolache@
supmaritime.fr

<https://doi.org/10.7225/imla30.09>

1. INTRODUCTION

Since the 1990's the International Maritime Organization (referred as IMO) started to encourage all parties involved in shipping to develop, implement and assess safety and pollution prevention management systems (International Maritime Organization, 1991) and to take into consideration fatigue as well as other human-related factors when making operational decisions. These resolutions acknowledged the need for increased focus on skills, education and training in connection with the human element and required in the safe operation of ships. Later, the STCW Convention and Code detailed those skills required for the seafarers to have, and with the time passing, their number and complexity has increased, until the present day when human capabilities, limitation and needs become as important as technical skills, a fact brought under attention with the latest initiatives to revise the text of this Convention.

Following the IMO Resolution A1173(33) (International Maritime Organization, 2023c) that sets strategic plan for the IMO from the year 2024 to 2029, the Strategic Direction 6 addresses specifically the focus of the Organization on the Human Element. Thus, presently and in the future, there is expected to have new or amended provisions related to training, certification and watchkeeping for the purpose of increasing the operational safety, fatigue management, but also fair treatment of seafarers, gender equality and the empowerment of women, prevention of bullying and harassment including sexual assault and sexual harassment.

The seafarers that perform duties onboard a ship must have a standard of competence which means, according to the STCW Code (International Maritime Organization, 2011) the level of proficiency to be achieved for the proper performance of functions on board ship in accordance with the internationally agreed criteria as set in the STCW Code and incorporating prescribed standards or levels of knowledge, understanding and demonstrated skill (Chapter I, Section A I/1 of the STCW Code).

The minimum standard of competences is further detailed in the different tables of the STCW Code (hereforth referred as The Code) with minimum levels of knowledges, understanding and proficiency, methods for demonstrating and evaluating these competences (International Maritime Organization, 2011).

Going thru the Sections A II/1, A II/2, A III/1 and A III/2 of the Code, it is to be observed that not all knowledges, understanding and proficiency are related with the technical aspects of keeping a safe watch (hereforth referred as technical skills) such as naviga-

tion, cargo care, stability, engineering, maintenance and operation of equipment. There are also competencies connected to the Bridge or Engine Room Resource Management which are set to facilitate the communication, to allow assertiveness, to prevent questionable decisions, generally aimed at facilitate the team work. These are interpersonal skills, connected with the Human Element and to all that this concept represents.

This article is identifying and suggesting a way to regulate the training and development of these human-related skills by looking into other international organizations that are focusing on this subject such as, American Psychological Association, European Federation of Psychologists Associations or Universities that are educating psychologists..

2. HUMAN-RELATED SKILLS REQUIRED BY STCW

In the latest version of the STCW Code, the knowledge, understanding and proficiency for shaping the human element (International Maritime Organization, 2010) are organized in levels of competence (operational level and managerial level) and are separated in two chapters of the Code: Chapter II specifying the competencies that Master and the Deck department personnel must have and Chapter III specifying the competencies required by the personnel working in the Engine-Room department.

Going thru these Chapters of the STCW Code (International Maritime Organization, 2011) it was found that the Merchant Marine Officers must demonstrate the following human element-related (or non-technical) skills:

1. To be able to demonstrate allocation, assignment, and prioritization of resources.
2. To understand assertiveness and leadership.
3. To obtain and maintain situational awareness.
4. The consideration of team experience.
5. Planning and co-ordination.
6. Personnel assignment.
7. To manage time and resource constraints.
8. To manage effective communication onboard and ashore.
9. To understand that decisions reflect consideration of team experiences.
10. To manage assertiveness and leadership, including motivation.
11. To manage situation and risk assessment (decision-making techniques).

12. To identify and consider generated options (decision-making techniques).
13. To select the course of action (decision-making techniques).
14. To evaluate outcome effectiveness (decision-making techniques).
15. To be aware of the importance of maintaining good human and working relationships aboard ship.
16. To know the basic teamworking principles and practice, including conflict resolution.
17. To understand social responsibilities; employment conditions; individual rights and obligations; dangers of drug and alcohol abuse.
18. To be aware of the importance of obtaining the necessary rest.
19. To know the effects of sleep, schedules, and the circadian rhythm on fatigue.
20. To know the effects of physical stressors on seafarers.
21. Knowledge of the effects of environmental stressors in and outside the ship and their impact on seafarers.
22. To be aware of the effects of schedule changes on seafarer fatigue.

For the personnel working on passenger ships the human-element related skills become more complicated and they are detailed in the Tables A V/2-1 and A V/2-2 and are connected to human behaviour, leadership skills and stress handling. In our article these are not object of comparison due to their limited application for certain ships only.

All of this knowledge, understanding and proficiency is in connection with perceptions, cognitions and mental processes like analysis and synthesis. They are sometimes in connection with the aptitudes and with the personality of seafarers and they influence the output of a team or an entire crew as a whole social group. They are superior mental processes that have to be acquired and demonstrated by the seafarers through training sessions designed with the assistance of IMO Model Courses such as: Bridge Resource Management (International Maritime Organization, 2023a), Engine Room Resource Management (International Maritime Organization, 2023b), Personal Safety and Social Responsibility (International Maritime Organization, 2016), Passenger Ship Crowd Management Training (International Maritime Organization, 2018) or Passenger Ship Crisis Management (International Maritime Organization, 2000).

For the purpose of demonstrating a connection between the Psychology and the non-technical skills,

this article will limit the investigation to the IMO Model Courses for Bridge and Engine Room Resource Management because these courses are required for officers working on board all merchant ships of more than 500 Gross Register Tons and with the propulsion power of more than 750KW and they are the vast majority of seafarers having to demonstrate and use these abilities.

3. A BRIEF INTRODUCTION TO IMO MODEL COURSES 1.22 AND 7.17

These courses are meant to ensure continued safe shipping as Mr. Kitak Lim said in their foreword (International Maritime Organization, 2023a, 2023b). They were validated by the 9th session of the IMO Subcommittee on Human Element, Training and Watchkeeping in February 2023. Their purpose is for guidance only and it provides flexibility to the trainers for adapting to the trainee's work experience and previous education. They are not to be regarded as official interpretations of the IMO instruments (International Maritime Organization, 2023a) (International Maritime Organization, 2023b).

The IMO Model Course 1.22 for Bridge Resource Management and 7.17 for Engine-Room Resource Management aim to support a uniform implementation of the requirements of the STCW Convention and Code. By using this document, the trainers in the maritime industry are able to shape in similar way one extremely important competence for the seafarer: to maintain a safe navigational or engineering watch by developing technical and non-technical skills of the so called "human element". The two model courses are the product of a multi-disciplinary work of groups of maritime professionals and pedagogy experts. They are detailing the course framework and outline, its objectives, they include a instructor manual and a guide for evaluation and assessment (International Maritime Organization, 2023a, 2023b). It is interesting to observe that in these documents are given some examples of non-technical skills that are recommended to be developed in the education process of the merchant marine officers (International Maritime Organization, 2023a, 2023b).

In both the IMO Model Courses 1.22 Bridge Resource Management and 7.17 Engine-Room Resource Management, the examples of non technical skills are split in categories as follows:

- A. Teamwork.
- B. Leadership and managerial skills.
- C. Situational awareness.
- D. Decision-making.
- E. Communication.

Both courses contains very similar skills because they are human-related and not technical.

4. THE MAIN LEARNING OBJECTIVES OF THE IMO MODEL COURSES FOR BRIDGE AND ENGINE-ROOM RESOURCE MANAGEMENT

The two IMO Model Course 1.22 Bridge Resources Management and 7.17 Engine-Room Resources Management in their 2023 (International Maritime Organization, 2023a, 2023b) version recommends an outline based on 5 sections:

1. The allocation, assignment, and prioritization of resources,
2. The effective communication,
3. The assertiveness and leadership,
4. Obtaining and maintaining situation awareness and
5. Consideration of team experience.

These sections are corresponding to the knowledge understanding and proficiency as stated in the Tables A-II/1, A-II/2, A-II/1 and A-III/2 of the STCW Code (International Maritime Organization, 2011), but the IMO Model Courses 2.12 and 7.17 are detailing even more the non-technical skills required for the merchant marine officers in their detailed outline section.

Here, in the detailed outline section (International Maritime Organization, 2023a, 2023b) International Maritime Organization recommends that students are able to explain, amongst other things:

1. Human error and the factors contributing to human error.
2. Cognitive dissonance, motivation and behavior.
3. Attitude.
4. Resistance to change.
5. Cognitive biases.
6. Principles of communication (sense and mind).
7. That eyes may deceive due to poor lighting, fatigue or stress.
8. That our senses and assumptions should be questioned to prevent misunderstandings.
9. That the master should set up an open communication style on the bridge that encourages challenge and appropriate responses from the whole bridge team.
10. Demonstrate that the bridge team members actively support each other.
11. Explain team member assertiveness.

12. Recognize the need for balance between authority and assertiveness.
13. Describe leadership qualities including self-awareness, situational awareness, interpersonal skills, motivation and respect.
14. Explain leadership characteristics, including assertiveness, decisiveness and applying emotional intelligence.
15. Describe effective leadership behaviors and skills necessary to achieve a shared task and situational awareness.
16. Analyze the ability to work with managers of different styles, to maintain safe working conditions, without threatening the command or leadership roles.
17. Explain factors affecting the decision-making process.
18. Demonstrate how to involve bridge team in the process.

All these items are using a taxonomy which is different from the items used to describe technical knowledge regarding the navigation, cargo, ship stability or engineering. For teaching the non-technical skills it is required to use different approaches compared to those that are teaching science. The question that rises from this observation is what kind of reference exists for teaching non-technical skills.

5. NON-TECHNICAL SKILLS AND PSYCHOLOGY

The Human Element is defined by the IMO since 1995 as a key element of the safety of life on board ships and a contributing factor to most of the casualties in the shipping sector (International Maritime Organization, 1995). In the Resolution A884(21) at page 13 (International Maritime Organization, 1999) the same concept is defined as a combination of People Factors with ship, management, organization working, living and other environmental factors. While the Ergonomics is studying the interactions among humans and other elements of a system in order to optimize human well-being and overall system performance (International Ergonomics Association, 2000), there are some elements that it is not yet clear what science is studying them.

In the same Resolution A884(21) (International Maritime Organization, 1999) for evaluate the People Factor, the investigator of a marine accident must identify:

1. Ability, skills, knowledge (outcome of training and experience).

2. Personality (mental condition, emotional state).
3. Physical condition (medical fitness, drugs and alcohol, fatigue).
4. Activities prior to accident/occurrence.
5. Assigned duties at time of accident/occurrence.
6. Actual behaviour at time of accident/occurrence.
7. Attitude.

These are also other aspects of the Human Element that are relevant for the safety of a ship.

The question is how to shape human behaviour, human attitude and human personality in the marine environment. Also, if the maritime training and education is achieving this goal, how the training is or will be regulated in order to be accepted by all Administrations. So far the science which is having the human mind as object of study is the Psychology, according to the definition given by the American Psychological Association (American Psychological Association, 2019).

Continuing in this direction, it is natural to ask the assistance of Psychologist for improving the way maritime industry is training its Merchant Marine Officers. Considering the same definition of Psychology as given by the American Psychological Association (referred as APA) as being the study of the mind and behavior or the supposed collection of behaviors, traits, attitudes, and so forth that characterize an individual or a group (American Psychological Association, 2018), this article is comparing in Table 1 the Core Competencies required for being a Psychologist (International Union of Psychological Science, 2015) with the knowledge, understanding and proficiency required by the learning objectives of the IMO Model Courses for Bridge and Engine-Room Resource Management (International Maritime Organization, 2023a, 2023b).

Some of the competencies required for the psychologists are obviously not required for the officers onboard the ships, the degree of knowledge and

Table 1. Competencies of Psychologists versus non-technical skills of Merchant Marine Officers

Core competencies for professional psychologists.	Knowledge, understanding and proficiency for the Deck and Engine Officers.
Establishes, maintains, and develops appropriate working relationships with clients and relevant others.	- Demonstrate that the bridge team members actively support each other.
Establishes, maintains, and develops appropriate working relationships with colleagues in psychology and other professions.	- Describe effective leadership behaviors and skills necessary to achieve a shared task and situational awareness. - Analyze the ability to collaborate with managers of distinctive styles, to maintain safe working conditions, without threatening the command or leadership roles.
Works with diversity and demonstrates cultural competence: - Demonstrates cultural humility. - Identifies, acknowledges, and respects diversity in relevant others. - Recognizes the impact of one's own values, beliefs, and experiences on one's professional behavior, clients, and relevant others. - Works and communicates effectively with all forms of diversity in clients, colleagues, and relevant others. - Is inclusive of all forms of diversity in working with clients, colleagues, and relevant others.	- Explain that the Master should set up an open communication style on the bridge that encourages challenge and appropriate responses from the whole bridge team. - Demonstrate that the bridge team members actively support each other.
Operates as an evidence-based practitioner: - Recognizes the limitations of the evidence available to inform practice.	- Explain cognitive dissonance, motivation, and behavior. - Describe cognitive biases. - Explain that eyes may deceive due to poor lighting, fatigue, or stress. - Explain that our senses and assumptions should be questioned to prevent misunderstandings. - Explain factors affecting the decision-making process.

Reflects on own work: - Evaluates the efficacy of one's activities and service provision. - Reflects on and implements areas for improvement in one's practice. - Reflects on one's own values and beliefs and the impact they may have on one's practice. - Validates reflections with peers or supervisors, when appropriate.	- Describe leadership qualities including self-awareness, situational awareness, interpersonal skills, motivation and respect. - Explain leadership characteristics, including assertiveness, decisiveness and applying emotional intelligence. - Analyze the ability to work with managers of different styles, to maintain safe working conditions, without threatening the command or leadership roles.
Conducts psychological interventions: - Plans and carries out psychological interventions with individuals, groups, communities, organizations, systems, or society.	- Explain that the Master should set up an open communication style on the bridge that encourages challenge and appropriate responses from the whole bridge team. - Demonstrate how to involve bridge team in the process. - Explain that the Master should set up an open communication style on the bridge that encourages challenge and appropriate responses from the whole bridge team. - Demonstrate how to involve bridge team in the process.
Communicate effectively and appropriately: - Communicate with diverse audiences as necessary for the effective conduct of one's professional activities. - Provides relevant and clear feedback, reporting and guidance to clients and relevant others. - Provides clear and objective information on psychological matters to relevant audiences.	- Explain principles of communication (sense and mind). - Explain team member assertiveness. - Explain that the master should set up an open communication style on the bridge that encourages challenge and appropriate responses from the whole bridge team. - Recognize the need for balance between authority and assertiveness.

proficiency required for Psychologists is different compared to the navigating officers but this review is pointing towards the conclusion that a Merchant Marine Officer must have some of the Psychologists skills, applied onboard the merchant vessels.

This conclusion is also suggested by the multi-dimensional characteristic of the education of Merchant Marine Officers that basically must be engineers or navigators, but also they have to be medical personnel, rescuers, radio officers, chemists, astronomers, IT officers, HR officers, accountants, legal counselors, insurance advisors, etc. By analyzing the Table 1, it seems that the use methodology that Universities are using for educating Psychologists would optimize the education of the Maritime Human Element.

Returning to our IMO Model course for the Bridge and for the Engine Resource Management, it also becomes clear that the shaping of the attitude and the behavior of the participants to these courses would be better done with the supervision of psychologists and using some elements of their curricula used in their schools.

For the above reasons in this article it also considered a compatibility between an average General Psychology course delivered at undergraduate level and the knowledge intended to be delivered during a IMO BRM or an ERM course.

In our quest for a regulated course about General Psychology, it was found that usually a General Psychology course is approved by a quality system or an international organization as a sign of a minimum standard of training, similar with the strategy set in the Maritime Education and Training by the STCW Convention and Code.

Considering that this article intention is to apply the Psychology in the training of the maritime Human Element, we have reviewed in Tables 2 and 3 several syllabuses that are accredited by international associations for training Psychologists. Due to the obvious differences in the competencies of a Merchant Marine Officer and a Psychologist, the review is only focusing on the General Psychology course at the undergraduate level.

Table 2. Subjects found in accredited syllabuses in North America

Universities in North America	Approaches in Psychology	Brain and nervous system	Sensing and perceiving	State of consciousness	Learning	Memory and judgment	Intelligence and language	Emotions and motivations	Personality	Social interaction
APA Standards of Accreditation for Health Service Psychology, Master's Program ¹	*	*	*	*	*	*	*	*	*	*
Université de Montréal Canada ²	*	*	*	*	*	*	*	*	*	*
Laval, Québec / Canada ³	*	*	*	*	*	*	*	*		*
Farleigh Dickinson University New Jersey, USA ⁴	*		*		*	*	*	*	*	*
Capella University, Minneapolis/ Minnesota/USA ⁵	*	*			*	*		*	*	*
University of North Dakota, Grand Forks, ND/USA ⁶	*	*	*		*	*	*	*	*	*

References: ¹ (American Psychological Association, 2021). ² (Université de Montréal, 2024). ³ (Université Laval, 2024). ⁴ (Fairleigh Dickinson University, 2024). ⁵ (Capella University, 2024). ⁶ (University of North Dakota, 2024).

Table 3. Subjects found in accredited syllabuses in Europe

Universities in Europe	Approaches in Psychology	Brain and nervous system	Sensing and perceiving	State of consciousness	Learning	Memory and judgment	Intelligence and language	Emotions and motivations	Personality	Social interaction
European Federation of Psychologists Associations (EFPA) ¹	*	*	*	*	*	*	*	*	*	*
Université Paris Cité / France ²	*	*	*	*	*	*	*	*	*	*
University of Bucharest/Romania ³	*	*	*	*	*	*	*	*	*	*
University of Gothenburg / Sweden ⁴	*	*	*	*	*	*	*	*	*	*
University of Split Croatia ⁵	*	*	*	*	*	*	*	*	*	*
British Psychological Society ⁶	*	*	*	*	*	*	*	*	*	*
University of Cardiff, UK ⁷	*	*	*	*	*	*	*	*	*	*

References: ¹ (European Federation of Psychologists' Associations, 2022, 2023). ² (Université Paris Cité, 2024). ³ (University of Bucharest, 2024). ⁴ (University of Gothenburg, 2025). ⁵ (University of Split, 2024). ⁶ (British Psychological Society, 2019). ⁷ (Cardiff University, 2025).

The main subjects taught in Universities about the human mind and behavior, in connection with the learning objectives of the IMO Model Courses 1.22 and 7.17, combined with the other projects like SHIELD Human Factors Taxonomy (Stroeve et al., 2023), point towards the necessity of introducing the study of basic Psychology into the education of the

Merchant Marine Officers or at least to involve the psychologists in the design of the human element training courses.

In the next part of the paper, these subjects are briefly introduced and compared to what a student must acquire as a soft skill in the maritime industry.

6. BASIC THEORIES IN PSYCHOLOGY AND THEIR APPLICATION IN A BRM/ERM COURSE

The first piece of Knowledge that any student must get in the Psychology courses is about the approaches used to explain how the human mind functions. There are many Professors that recommend different books to their students but due to the accreditation by the APA, and for the purpose of rigorous demonstration, the author is taking as example of course content the reference book given for the General Psychology course of the University of North Dakota (University of North Dakota, 2024).

This reference book is the 11th edition of "Psychology: Themes and Variations" (Wayne Weiten, 2022) and in the chapter about the evolution of the psychology the authors explain on page 12 in table 1.5 the contemporary theoretical perspectives in psychology which basically represent the six ways of explaining how human function.

Let us take these approaches one by one and compare them with the learning goals that a BRM/ERM course has:

1. The behavioral approach. According to this theory, human (and animal) behavior is a result of the influences of the environment, and if we want to study scientifically the behavior, we can only relate to observable events like stimulus-response relations (Wayne Weiten, 2022). In this approach the Psychology is focusing only on the observable human behavior, leaving out thought and emotion. One of the assumption of this theory is that people learn their behavior from the world around them and this behavior is the result of a stimulus that triggers a particular response (Jo Hemmings, 2018). Based on this theory the human behavior can be explained as stated in the IMO Model Course 1.22 Bridge Resource Management on page 12 (International Maritime Organization, 2023a) and IMO Model Course 7.17 Engine-Room Resource Management on page 11, objective .9 (International Maritime Organization, 2023b).

2. The psychoanalytical approach. This theory introduces the concepts of Conscious, Preconscious and Unconscious mind and states that behavior is decided mostly by our unconscious mind. The basic premise is that unconscious motives and experiences in early childhood govern personality and mental disorders (Wayne Weiten, 2022). The personality and behavior are the outcome of continuous conflicts in the mind. The individual is not usually aware of these conflicts because it is happening at the unconscious level. This theory employs the concept of defense mechanism that is used when facing anxiety or

unpleasant emotions (Jo Hemmings, 2018). This approach can be used to explain missed actions or missed communication, distorted defense or coping mechanisms, particular sex-related behaviors, personality issues and the consequences of hidden impulses, desires and thoughts on social and work-related behavior. This approach can be used to achieve learning goals stated in the IMO Model Course 1.22 BRM and IMO Model Course 7.17 regarding effective communication, assertiveness and leadership (International Maritime Organization, 2023b, 2023a).

3. The humanistic approach. The basic premise of this approach is the idea that humans are free, rational beings with the potential for personal growth, and they are fundamentally different from animals. Human experience is unique for each individual and the potential of growth can be achieved with the inner resources of the person (Wayne Weiten, 2022). The theory centers on a person subjective view of themselves and who they would like to be, rather than the objective view of an observer. One of the basic assumptions is that primary goals in life are emotional and mental growth and fulfillment (Jo Hemmings, 2018). This approach can be applied for explaining the following learning goals on IMO Model Course 1.22 Bridge Resource Management (International Maritime Organization, 2023a):

- a. 2.3 – page 14 – show that Bridge Team members actively support each other.
- b. 2.4 – Cultural awareness.
- c. 3.1 – Authority and Assertiveness.
- d. 3.2 – Effective Leadership (describe leadership qualities including self-awareness, interpersonal skills, motivation and respect, etc.).
- e. 5.2 – Workload management and delegation (maintaining a reasonable workload for team members and supporting the Master and the Pilot for keeping this reasonable level of workload)
- f. 5.3 – Decision-making process (demonstrate how to involve the Bridge team members in the process).

Similar aims can be found on the IMO Model Course 7.17 Engine Resource Management (International Maritime Organization, 2023b).

4. The cognitive approach. This theory focuses on thoughts and mental processes, and its basic premise is that human behavior cannot be fully understood without examining how people acquire, store, and process information (Wayne Weiten, 2022). The theory is comparing mental processes with computation theories and assumes that the human mind takes in

information, processes it, stores and recalls it when need it. It involves processing sensory information, judgment, reasoning, logic, learning processes (Jo Hemmings, 2018). This theory is particularly useful in explaining the following learning objectives for our IMO Model Courses 1.22 and 7.17 (International Maritime Organization, 2023a, 2023b):

- f. Explain human error and factors contributing to human error.
- g. Explain cognitive dissonance.
- h. Describe cognitive biases.
- i. Decision making process – all the learning objectives are easy to acquire once the cognitive approach has been studied.

5. The biological approach. This theory focuses on the physiological, genetic, and neural bases of behavior in humans and animals. Its basic premise is that an organism's functioning can be explained in terms of the brain structures and biochemical processes that underlie behavior (Wayne Weiten, 2022). People thoughts, feelings and behavior derive all from their biology, including genetics. One of the basic assumptions is that the nature is more important than the nurture of the human mind (Jo Hemmings, 2018). The following learning objectives from our relevant IMO Model Courses (International Maritime Organization, 2023a, 2023b) can be achieved using this theory:

- a. Principles of effective communication (explain that eyes may deceive, hearing may deceive, our senses and assumptions should be questioned, etc.).
- b. Obtaining and maintaining situational awareness, explaining automation dangers.
- c. Describe the quality of information.

6. The evolutionary approach. This theory also focuses on the basis of human and animal behavior with the idea that its patterns have evolved to solve adaptive problems; natural selection favors behaviors that enhance reproductive success (Wayne Weiten, 2022). This theory facilitates the explanation of optimization of Bridge and Engine-Room members behavior and gives the leaders a clear understanding of the concept of motivation, reward, punishment, evaluation, integration, performance, level of the workload and others based on concepts like natural selection, psychological adaptations, individual differences and the evolution of information processing (Jo Hemmings, 2018).

As is highlighted above, it is recommended to learn the basic concepts in Psychology before having to integrate more complicated concepts that relate to superior mental processes and that are not studied

by the Merchant Marine Officers and Cadets in their curricula. If the basic concepts seem too complicated for the average Maritime School student, there are a variety of other publications that facilitate the explanation of human mind and behavior at a simpler lever, for example "Psychology for Dummies" (Adam Cash, 2020), or "How Psychology Works" (Jo Hemmings, 2018).

7. CONCLUSION

This paper draws attention to a potential connection and gap between the learning objectives of the IMO Model Courses 1.22 Bridge Resource Management and 7.17 Engine-Room Resource Management on one side and the basic concepts of the Psychology on the other side. As pointed above, there is a certain degree of resemblance between the initial training of a Psychologist and the Human Element training goals given by the IMO.

The question that rises from this fact is whether we should continue developing IMO Human Element courses with or without the help of chartered Psychologists. As it is underlined in Tables 2 and 3, the study of Psychology is getting increasingly structured, with national and international organizations that are regulating knowledge on the Human Element as IMO sees it. In consequence, it seems to be useful for the maritime industry to jointly work with psychologists and to develop a multi-disciplinary group for study and shaping the behavior of the seafarers towards several major purposes of the IMO: safety of navigation, cultural inclusion, mental health and wellbeing of seafarers. On the other hand, all these objectives will finally lead to better performance of employees (Sampson and Ellis, 2021; Senbursa and Dunder, 2024).

For the long-term project to improve the seafarers non-technical skills, the Maritime Education and Training establishments should probably consider to have post-graduate programs for Maritime Psychology and to recruit and specialize Psychologists for the maritime industry and human factors (Postolache, 2024). These programs can be designed by teams of Marine and Human Resource Officers, collaborating with organizational Psychologists, Mental Health professionals, Ergonomists and Anthropologists.

Considering that there are approximately 1.9 million seafarers engaged in international shipping (International Chamber of Shipping, 2021) and that according to the World Health Organization, there are an average number of 20 psychologists per 100000 persons (World Health Organisation, 2016) it seems necessary to have a corpus of approximative

200 Marine (or Maritime) Psychologists. This body of specialists can be developed in a decade by having one or two classes of post graduate students. This will also help with the research in the maritime human factor because at the end of each class, the students will have to produce scientific papers.

Returning to the IMO Resolution 1173 and the Strategic Plan for the IMO until 2029 and reviewing the Strategic Direction 6 (Address the Human Element) (International Maritime Organization, 2023c) the human element will be the object of focus, regulation and collaborative work with other organizations and stakeholders. This article suggest also that Strategic Direction cannot be properly achieved without the assistance of the Psychologists. Their role in the International Maritime Organization is yet to be discovered and a high standard of a Bridge or an Engine-Room Resource Management course should be designed involving the same specialists.

Conflict of interest: Author declares that there is no conflict of interest.

REFERENCES

- Adam Cash, 2020. Psychology for Dummies. 3rd ed. Edited by For Dummies. Wiley.
- American Psychological Association, 2018. APA Dictionary of Psychology. Available at: <https://dictionary.apa.org/psychology> (Accessed: 16 June 2025).
- American Psychological Association, 2019. APA Dictionary. Available at: <https://dictionary.apa.org/> (Accessed: 11 June 2025).
- American Psychological Association, 2021. Standards of Accreditation for Health Service Psychology: Master's Programs APPROVED FEBRUARY 2021. Available at: <https://accreditation.apa.org/> (Accessed: 12 June 2025).
- British Psychological Society, 2019. Standards for the accreditation of undergraduate, conversion and integrated Masters programmes in psychology The British Psychological Society Promoting excellence in psychology. Available at: <https://cms.bps.org.uk/sites/default/files/2022-07/Undergraduate%20Accreditation%20Handbook%202019.pdf> (Accessed: 11 June 2025).
- Capella University, M.U.S.A., 2024. Online Psychology Degree Program | General Psychology Courses – Capella University. Available at: <https://www.capella.edu/online-psychology-degrees/bs-psychology-program/bachelors-general-psychology/courses/> (Accessed: 11 June 2025).
- Cardiff University, 2025. Psychology (BSc) – Study – Cardiff University. Available at: <https://www.cardiff.ac.uk/study/undergraduate/courses/course/psychology-bsc> (Accessed: 11 June 2025).
- European Federation of Psychologists' Associations, 2022. Bachelor's degree – EuroPsy-Bg. Available at: <https://europsy-bg.com/en/bachelors-degree/> (Accessed: 11 June 2025).
- European Federation of Psychologists' Associations, 2023. EuroPsy-the European Certificate in Psychology. Available at: https://www.efpa.eu/sites/default/files/2025-01/europsy_regulations_july_2023_ga_brighton_v2_0%20%281%29.pdf (Accessed: 12 June 2025).
- Fairleigh Dickinson University, N.U., 2024. PSYC 1201 – General Psychology at Fairleigh Dickinson University | Coursicle FDU. Available at: <https://www.coursicle.com/fdu/courses/PSYC/1201/> (Accessed: 11 June 2025).
- International Chamber of Shipping, 2021. Shipping and World Trade: Global Supply and Demand for Seafarers | International Chamber of Shipping. Available at: <https://www.ics-shipping.org/shipping-fact/shipping-and-world-trade-global-supply-and-demand-for-seafarers/> (Accessed: 16 June 2025).
- International Ergonomics Association, 2000. What Is Ergonomics (HFE)? | International Ergonomics Association. Available at: <https://iea.cc/about/what-is-ergonomics/> (Accessed: 7 July 2025).
- International Maritime Organization, 1991. Res. A.680(17) IMO guidelines on management for the safe operation of ships and for pollution prevention – revoked. Available at: <https://vp.imo.org/Customer/Subscriptions/IMO-Vega/MemberPages/IMODocument.aspx?resultIndex=49&docId=RESLA680ARS&docDate=2025-05-14> (Accessed: 16 June 2025).
- International Maritime Organization, 1995. Human Element. Available at: <https://www.imo.org/en/OurWork/HumanElement/Pages/Default.aspx> (Accessed: 16 June 2025).
- International Maritime Organization, 1999. Resolution A.884 (21).
- International Maritime Organization, 2000. Proficiency in Crisis Management and Human Behaviour Training Including Passenger Safety, Cargo Safety and Hull Integrity Training. Edited by IMO. London: International Maritime Organization. Available at: <https://doi.org/10.62454/ET129E>
- International Maritime Organization, 2010. IMO-Vega>STCW Conventions and Codes>STCW Code Consolidated Edition. Available at: <https://vp.imo.org/Customer/Subscriptions/IMOVega/MemberPages/Contents.aspx?nodeId=IDB09F2CCD> (Accessed: 16 June 2025).
- International Maritime Organization, 2011. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Edited by International Maritime Organization. London: International Maritime Organization. ISBN 9789280115284
- International Maritime Organization, 2016. Personal Safety and Social Responsibilities. Edited by IMO. London: International Maritime Organization. Available at: <https://doi.org/10.62454/ETB121E>

- International Maritime Organization, 2018. Passenger Ship Crowd Management Training. Edited by IMO. London: International Maritime Organization. Available at: <https://doi.org/10.62454/KT141E>
- International Maritime Organization, 2023a. Bridge Resource Management. London: International Maritime Organization. Available at: <https://doi.org/10.62454/KTB122E>
- International Maritime Organization, 2023b. Engine-Room Resource Management. London: International Maritime Organization. Available at: <https://doi.org/10.62454/KT717E>
- International Maritime Organization, 2023c. 'Resolution A.1173(33); (strategic plan for the organization for the six-year period 2024 to 2029), pp. 6–10.
- International Union of Psychological Science, 2015. International Declaration on Core Competences in Professional Psychology. Available at: <https://www.iupsys.net/wp-content/uploads/2021/09/the-international-declaration-on-core-competences-in-professional-psychology-1.pdf> (Accessed: 12 June 2025).
- Jo Hemmings, 2018. How Psychology Works. Applied Psychology visually explained. 1st edn. Edited by Anna Chiefetz et al. New York: Penguin Random House.
- Postolache, O., 2024. Maritime Psychology-an integrated training approach. Marseille. Available at: <https://imla29.org/Publication.aspx> (Accessed: 16 June 2025).
- Sampson, H. and Ellis, N., 2021. 'Stepping up: the need for Proactive Employer Investment in Safeguarding Seafarers' Mental Health and Wellbeing', Maritime Policy & Management, 48(8), pp. 1069–1081. Available at: <https://doi.org/10.1080/03088839.2020.1867918>
- Senbursa, N. and Dunder, E., 2024. 'The Mediating Effect of Well-Being, Happiness, and Trust in the Relationship Between Work-Life Balance and Work Effectiveness in Seafarers', INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 61. Available at: <https://doi.org/10.1177/00469580241254745>
- Stroeve, S. et al., 2023. 'SHIELD Human Factors Taxonomy and Database for Learning from Aviation and Maritime Safety Occurrences', Safety, 9(1), p. 14. Available at: <https://doi.org/10.3390/safety9010014>
- Université de Montréal, C., 2024. Baccalauréat en psychologie – Campus Montréal – Université de Montréal – Admission. Available at: <https://admission.umontreal.ca/programmes/baccalaureat-en-psychologie-campus-montreal/structure-du-programme/> (Accessed: 11 June 2025).
- Université Laval, Q.C., 2024. Baccalauréat en psychologie – Structure du programme | Faculté des sciences sociales | ULaval. Available at: <https://www.fss.ulaval.ca/etudes/baccalaureat-en-psychologie/structure-du-programme> (Accessed: 11 June 2025).
- Université Paris Cité, I. de P., 2024. 'Guide_des_etudes_2024_2025_a_Psychologie_Paris'. Available at: https://psychologie.u-paris.fr/wp-content/uploads/sites/10/2024/11/Guide_des_etudes_2024_2025_a.pdf (Accessed: 16 June 2025).
- University of Bucharest, 2024. Syllabus for undergraduate Psychology courses, Teaching of Psychology. Available at: <https://fpse.unibuc.ro/fisele-disciplinelor/> (Accessed: 11 June 2025).
- University of Gothenburg, 2025. Introduction to Psychology and Profession – reading list | University of Gothenburg. Available at: <https://www.gu.se/en/study-göteborg/introduction-to-psychology-and-profession-pm1621/reading-list/08d161e5-11e4-11ef-a272-18dd79e54a0c> (Accessed: 11 June 2025).
- University of North Dakota, 2024. PSYC 111 20343 Introduction to Psychology – Simple Syllabus. Available at: <https://und.simplesyllabus.com/en-US/doc/cm118kyc6/SPEA-PSYC-111-20343-Introduction-to-Psychology?mode=view> (Accessed: 11 June 2025).
- University of Split, Faculty of Humanities and Social Sciences, 2024. Psychology – Faculty of Humanities and Social Sciences, Split. Available at: <https://www.ffst.unist.hr/en/departments/psychology> (Accessed: 11 June 2025).
- Wayne Weiten, 2022. Psychology: Themes and Variations, 11th edition. Edited by Cengage. Boston: Cengage.
- World Health Organisation, 2016. 'GHO | By category | Mental health workers – Data by country', WHO [Preprint]. Available at: https://apps.who.int/gho/data/node.imr.MH_9?lang=en (Accessed: 16 June 2025).