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Empowering Skills for an Active Ageing and Healthy Living

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Abstract. The chapter is aimed at describing four different approaches, each supported by experimental findings, which can be adopted to empower life skills in the elderly. The first approach consists in stimulating aged persons by asking them to carry out some tasks aimed at activating the brain and mental processes which are targeted by the intervention. In the second approach the elderly are hinted at thinking about their mental states to understand one's own and others' behavior to act as a reflective agent. The third approach is based on the assumption that the communication context can support and improve old people's skills, if the messages they receive are devised so to focus their attention on relevant information and to elicit relevant cognitive frameworks. According to the fourth approach, aged people can be engaged in activities which enjoy them so to express themselves in personal ways and to practice a wide set of mental functions. Becoming aware of the pros and cons of each approach enables us to choose the kind of intervention which is most suited to the elderly, taking into account the features of the context and the actual resources which can be employed. We also aim at integrating the different approaches so to devise a holistic intervention in which synergies among the methodologies to be applied occur.

Keywords. Empowerment, Cognition, Social Cognition, Skill, Health, Ageing, Elderly, Neurostimulation, Theory of Mind, Decision making, Food, Communication, Persuasion, Music, Enjoyment.

Introduction

The steady increase in life prospects and the on-going socio-economic level of our society call for reflection about the issue of ageing and the ageing process. The elderly person is more and more seen as the protagonist in a perspective of *active ageing* [1], defined as the process of optimizing opportunities for participation in paths of health, safety, and socialization, which improves the quality of life and implements the potentialities for physical and mental wellbeing [2].

The classical conception of old age as characterized mainly by losses and by a decrease in individual skills, often exacerbated by the onset of diseases, has been

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gradually replaced by more articulated concepts [3]. A distinction is now made between primary ageing (the changes due to ageing, without becoming ill), secondary ageing (characterized by the onset of chronic diseases, which affect the individual's adaptation to the environment) and tertiary ageing (the period immediately preceding the term of existence, characterized by a rapid decline of the skills of the individual).

As far as primary ageing is concerned, the recognition of the differences between physiological and pathological ageing has stimulated the study of the functional changes of the elderly person on the behavioral as well as on the neural levels, prompting some reflections about the possibility of supporting the person in this critical phase of the existence. The notion of "empowerment" [4] can serve as a framework to conceptualize the attempts to take care of old people in order to: a) help them to keep their current levels of mental functioning; b) prevent possible decay in cognitive and social skills; c) cope with adverse events and negative experiences; d) exploit latent resources. However, it is not yet clear which is the best approach to support and enhance elderly's capabilities [5].

In this chapter we describe four different approaches, each supported by experimental findings acquired through research programs currently in progress within the Department of Psychology of the Catholic University of the Sacred Heart of Milan. We highlight how such approaches can be integrated in a common framework which, on the one hand, takes into account the specific features of each of them and, on the other hand, suggests possible synergies among them.

The first approach consists in stimulating aged persons by asking them to carry out some tasks aimed at activating the mental processes which are targeted by the intervention. The proposed exercises can be executed in a condition in which brain stimulation should increase the modifiability of the brain networks involved in the task, so to enhance the effects of the training. Individuals, however, are not only mere executors of the activities in which they are involved, especially in the domain of social interactions. They can also reflect about the underlying mental processes. Meant as reflective agents, old people should be supported in maintaining the ability to develop an adequate Theory of Mind about both their own and others' cognitive and emotional processes. To do so, interventions rely on the individual's reflective attitude, which is the core of the second approach considered here. If we think to the elderly in their usual living environments, we realize that the context can also support and improve their skills, for instance through the communication which is addressed to them. If the messages they receive are devised so to focus their attention on relevant information and to elicit relevant cognitive frameworks, old people can be motivated to follow healthy habits in their life. This is the third approach, which is exemplified in this chapter by making reference to the case of nutrition. The last approach starts from considering that also leisure activities can provide the opportunity to promote an active ageing. Old persons have their own interests and talents which they express, for instance, in the field of arts. Thus, if we engage aged people in activities based on artistic languages which enjoy them, we can lead them to exercise a wide set of mental functions.

1. Cognitive and Brain Stimulation

1.1. The Background

The recognition of a differentiation between physiological and pathological ageing has stimulated the investigation of biological functional changes of the elderly person, soliciting some reflections on the possibility to support people in this critical phase of their existence. From the neurobiological perspective the old ageing is a specific life stage only apparently critical. Indeed it is also a powerful phase for maintaining and strengthening the quality of physiological, cognitive and emotional processes, as well as the stabilization of the existing relational networks. At this regard, the conception of *cognitive reserve* is crucial, being understood as a protected pool of resources from which to draw as a function of the demands of everyday life, not only in the case of difficulties or functional impairments [6]. This phase of the lifespan is characterized as a dynamic condition on which it is possible to intervene with a view of strengthening in order to adequately sustain the physiological process of ageing, which may also include a gradual weakening condition [7]. To support this functional process, one of the main challenges concerns the ability to adopt *proficient strategies*, both self- and hetero-induced. The former are based on virtuous self-managed "learning approach" that should become the objects of further "reinforcement" externally induced. The strategies of the second type provide for the intervention of external aids, such as specific cognitive training. Both of these strategies can engage on contextual supports, which facilitate the reinforcement of the cognitive wellbeing, in particular based on some appropriate environmental stimuli (social networks and caregiver support), as well as the best practices of life (consumption habits, physical activity and so on).

The contribution of neuropsychology in reference to cognitive functions is twofold: it concerns the possibility of early detection of prognostic markers of phenomena of decay and the possibility of specific intervention programs, through the stimulation or enhancement of *preserved skills*, with the intent to modulate the effects of the decay and to potentiate the functional "reserve". The idea at the basis of cognitive and neurophysiological stimulation is that, in the progression of the lifespan, the partial neuronal decay induces the weakening of the cognitive functions. In agreement with evidence relating to *brain plasticity*, the reactivation of the networks which mediate these functions can foster a sort of cognitive "re-empowerment".

Unlike traditional methods, the latest techniques combine the execution of tasks with the pre-potentiation of specific neuronal circuits. The experiential learning is thus facilitated by the availability of a more receptive brain, as well as a "selectively stimulated brain". The pre-enhancement of neuronal circuits is achieved thanks to new tools which act directly on the brain, by using magnetic and electrical stimulation, showing a positive impact not only on the fully preserved skills, but also on the residual abilities (*cognitive resilience effect*).

1.2. The Research Program

A study was recently conducted to test the effectiveness of treatment for cognitive and neurophysiological enhancement within the domain of some specific cognitive processes [8]. The project aims at defining opportunities for intervention in old population and at validating tools and good practices for assessing and empowering

the set of skills necessary to face everyday tasks. Specifically, our research focused on two main topics: the domain of global cognitive skills, which are pervasively used in various life contexts, and the domain of specific skills, which are relative to specific cognitive activities.

Going down to specifics, we tested the effect of neuropsychological and neuromodulation protocols for the empowerment of cognitive abilities. Thus the project pursues the interdependent goals of testing the efficacy of *empowerment pathways* in healthy elder population and, then, identifying potential intervention protocols to prevent or slow down cognitive decline and pathological ageing. More specifically it covers the following three objectives:

a) to investigate the effectiveness of *self- and hetero-induced mechanisms* which take advantage of brain plasticity and reorganization in the enhancement and/or maintenance of the cognitive reserve (physiological ageing);

b) to identify action plans for the prevention or slowing of cognitive impairment (pathological ageing) through capacity building to preserve and maintain a satisfactory degree of autonomy, in order to limit the risk of developing diseases associated with ageing (dementia, associated degenerative syndromes, depressive profiles and so on);

c) to use neurostimulation methods (transcranial Direct Current Stimulation, tDCS) [9,10] for the potentiation of the preserved functions in conjunction with the classical cognitive techniques. This methodology was applied in order to strengthen the mechanisms of brain plasticity underlying the maintenance of the main cognitive functions.

In order to evaluate the *short-term* and *long-term efficacy* of our target protocols we compared different treatment groups through the following research steps:

- *pre-intervention (T0)* (mean time duration: 1 week). The assessment procedure included in-depth *focused neuropsychological testing*, analysis of global functioning level, and *basic electrophysiological testing* by means of electroencephalography (EEG) recording at rest (eyes open/closed) and during a challenging attentional task.
- *intervention (T1)* (mean time duration: 3 months). This phase was devoted to brain stimulation. The sample (54 subjects, matched for the main statistical and demographic parameters) was divided into three experimental groups through randomization. The experimental groups were defined as follows: Group A, *control condition*; Group B, *cognitive stimulation* by computer-based tools; Group C: *electrophysiological brain stimulation* techniques using non-invasive neuromodulation (tDCS) with a concomitant twice-weekly application of selected tasks related to some cognitive functions.
- *follow-up (T2)* (mean time duration: 1 week). This phase was devoted to test the *long-lasting effects* induced by the treatments mentioned above. At 3 months after the conclusion of the treatments, a follow-up assessment was conducted which included a neuropsychological assessment and electrophysiological and functional evaluation technique (EEG).

Overall, preliminary evidence elucidated an improved performance in the experimental subjects (groups B and C) who completed the cognitive/neuromodulation process of empowerment in determined cognitive areas. Specifically, the cognitive and neuromodulation treatment produced a significant increased performance in memory and executive (mainly non-verbal) tasks. These effects are manily obtained by brain plasticity modulation. Consistently, in a final

interview the experimental groups B and C reported the subjective perception of an improvement in their overall functioning in daily life and described the training as challenging and not problematic [11].

2. Theory of Mind and Decision- Making

2.1. The Background

The psychological literature highlights the progressive decay not only of cognitive, but also of socio-cognitive skills which contribute to the ability to interact with others as, for example, the ability to understand one's own and other's behaviour through the inference of intentions, emotions, desires and beliefs (the so-called Theory of Mind: ToM) and the ability to make proper evaluations and decisions within social relationships.

The literature has widely documented the development of ToM both in physiological and pathological ageing [12,13], highlighting a decay of this ability through behavioral (performances in classical paper-pencil tasks) and neural evidences (brain activations detected through brain-imaging techniques). In particular, in healthy elderly engaged in a well-known task of attribution of mental states through the eye-gaze of the other person, the performance was identical to that of a control group of young adults, but with the presence of a significant difference in terms of activations of the brain areas underlying the performance [14]. Similarly, a group of elderly people diagnosed with Mild Cognitive Impairment of the amnestic type (aMCI) at high risk of progression in Alzheimer's disease showed in the same task a performance which was similar to that of a group of healthy elderly controls, although in presence of a lower activation of the neural areas involved [15]. A sort of "mismatch" between the two considered levels seems to emerge: the performance at the behavioral level is substantially preserved both in physiological ageing and in the condition at risk of clinical progression, compared to the changes at the neural level. Moving on the pathological side with senile dementia, the literature shows clear evidence of the decay in ToM [16] and, interestingly, an initial decay of this skill from the more complex levels (understanding of the 2nd order level of recursive thinking: "I think that you think that he thinks") at the onset of Alzheimer's disease [17,18].

The ability of decision making in healthy elderly has been poorly investigated although the knowledge of its functioning and the prevention of its deterioration may be crucial to maintain the autonomy of the elderly person and his/her sense of self-efficacy in real-life contexts. The theme has its own importance from a legal point of view for the legal protection of the elderly in situations of cognitive impairment.

The research program which is outlined in the next section aims to achieve two goals. First, socio-cognitive skills in the life-span are assessed so to identify possible changes in healthy elderly subjects so to figure out supporting and/or rehabilitative interventions that may provide an overall improvement in the quality of life. ToM, as a component of the broader socio-cognitive competence, is a relevant candidate for this purpose, as it is widely involved in the relational domain, and therefore it is potentially implicated in the maintenance of the personal and relational well-being, particularly with the caregivers. The possibility to promote the maintenance of the previous spaces of self-efficacy would have a significant impact in terms of

sustainability, as it would have a positive impact on the high social costs now necessary to take care of people diagnosed with senile dementia.

Secondly, we intend to explore some facets of decision making in elderly people as well as the representations of the financial and economic crisis which occurred in recent years. In fact, the changes that have affected the global scenario of the economic and financial markets have had an impact not only on the business world, but also on families and individuals. The present cultural-historical contingency puts in evidence the complexity of the choices and of the decisions that the individual performs in the economic and financial domain. In this perspective, the international studies have focused on the perspective of the individual as a consumer of financial products. In contrast, in a systemic view the economical and the financial skills of an individual should be considered not only in relation to his/her consumption, but also to his/her ability to understand the critical points of the economic and financial system. Therefore, it is of primary interest to investigate the decision-making skills and the representations of the economic crisis on the part of elderly individuals, a segment of the population who is particularly interesting in that it is engaged in the management and use of capitals resulting from the choices and decisions made in the course of life and with a time-horizon and, in some cases, socio-cognitive and decisional abilities different from that of the younger age groups.

2.2. The Research Program

In the light of the theoretical framework and of the main goals briefly presented so far, the research program involved individuals over the age of 65 in the phase of primary ageing.

Regarding the first goal, the assessment of ToM, participants performed the following tasks: the Eyes Test, which requires to label the eye-gaze of a person choosing between words with an emotional content (e.g., sad or angry) and an epistemic content (e.g., doubtful, thoughtful, concentrated) and a control task, the Gender Test, which simply requires to indicate the gender of the person; a self-report scale of mentalizing, that requires to express the degree of agreement with statements concerning the evaluation of one's own capacity of mentalization (for example, "I can read the intentions of others from their face").

Regarding the second goal (decision making and the representations of the economic and financial crisis) a questionnaire with open questions about the causes, consequences and possible remedies of the economic crisis has been proposed. Different components of decision making were also investigated, such as the sensitivity to fairness and the risk attitude. Behavior in decision making was assessed with the Ultimatum Game [19], an interactive game with a single-shot money exchange, where the subject decides how to divide an amount of money (10 euro) with an unknown partner, knowing that if the partner will accept, the exchange will be successful, whereas if he/she refuses, no one will gain anything. In this case, to assess the sensitivity to a social norm of fairness, the methodological structure devised by Bicchieri and Chavez [20] was adopted, in which the decision maker can choose between a fair option (5-5), an unfair option (8-2) and the coin toss to determine the outcome (head 5-5, tail 8-2). Risk attitude was measured through the completion of two questionnaires, relating to the perception of risk and to the propensity to act in a risky way [21].

On the basis of a preliminary analysis of the data we can say that ToM is substantially preserved in the age group considered, thus opening up interesting ideas for strengthening a skill that, as we know from literature, becomes subjected to decline in the later stages.

With regard to the representations of the crisis, we identified 34 types of causes, 16 possible remedies and 6 categories of consequences. The causes recognized by the experts as being the origin of the financial crisis are not mentioned. Instead, people privilege representations linked to the decisions and the inadequacy of the politicians.

At the level of decision making, subjects are strongly oriented towards a fair behavior in the decision of the division of money, whereas the analysis concerning risk attitude is still in progress.

In future works we will proceed to further studying the neural basis of ToM and of decision making, in order to enrich the understanding of these skills not only in terms of behavior, but also of the neural components, to foresee adequate interventions.

3. Communication

3.1. The Background

A healthy diet provides the energy and substances that are necessary for the proper functioning of our body and mind. The link between nutrition and health is particularly evident in the case of the elderly, as many problems typical of this stage of life – such as diabetes, hypertension, cardiovascular disease and various types of cancer – are closely connected to past and present unhealthy eating habits [22]. By changing and adjusting these habits, it is possible to avoid or reduce the need for expensive medical and pharmacological treatment in later years. As a result of the steadily increasing average life expectancy, people entering the third age (conventionally set at 65 years) will likely face another 20 or 25 years of life. Prevention therefore becomes important also in later stages of life.

Adopting healthy eating habits not only prevents illnesses and diseases, but also encourages the development and activation of specific resources in terms of autonomy and self-efficacy, allowing the elderly to maintain for a longer time their autonomy in daily living activities, as well as in life in general [23]. Such self-empowerment skills developed or improved by purposely changing eating habits can be applied also in other aspects of older adults' lives, allowing them to go through the ageing process in an active and successful way.

This goal can be achieved through targeted communication campaigns that promote awareness of the positive and negative effects of eating habits on health. In addition to promoting knowledge and awareness, communication campaigns should support the motivation and the intention to adopt the proposed healthy eating habits. Changing one's eating behaviour is a very hard and demanding task, especially after years or decades of established routine. However, effective communication on these topics can help activating the necessary skills and motivations to adopt a healthy, and at the same time rewarding, diet.

Numerous studies on health communication have shown that healthy behaviours and their consequences can be framed in different ways. For example, a persuasive message can provide information regarding the effects on health of a balanced diet by

emphasizing either the positive consequences of healthy eating (*gain frame*) or the negative consequences of unhealthy eating (*loss frame*). Message framing provides recipients with information about the context that guides their interpretation of the content of the message, ultimately affecting information processing and decision making. Research on health communication has shown that when the proposed behaviour concerns the identification of a possible disease (e.g., undergoing regular mammography), loss-framed messages may be more effective than gain-framed messages. Conversely, when the suggested behaviour concerns the prevention of possible diseases (e.g., delaying the onset of osteoarthritis by increasing physical activity), gain-framed messages can be more effective than loss-framed messages [24]. Similarly, in communication promoting healthy eating behaviour a loss-framed message might be more effective in conveying information of the negative effects of certain foods (e.g., those rich in animal fats or sodium) on health, whereas a gain-framed message might be more effective in promoting the adoption of healthy eating habits. So far, however, the effects of message framing in campaigns promoting healthy eating have been poorly investigated, especially in the case of messages addressed to the elderly.

The effects of framing in communication about health and nutrition are also likely to depend on several individual characteristics of recipients, including those related to age. Research on health communication, for example, has shown that personal interest and previous knowledge on the topic of persuasive messages influence the effects of message framing [25]. In particular, loss-framed messages are more convincing than gain-framed messages among people with less interest and knowledge of the topic, whereas those with stronger interest and knowledge tend to be less affected by the way messages are framed. Consistently, one might expect the degree of knowledge regarding nutrition facts and the effects of different foods on health to influence the effectiveness of messages promoting healthy eating among the elderly.

Another individual characteristic of recipients that might influence the effects of gain- and loss-framed messages promoting healthy eating is regulatory focus [26], that is, the individual orientation to regulate one's own behaviour to achieve positive states (*promotion focus*) or to avoid negative states (*prevention focus*). Past research found that ageing tends to shift people towards a stronger prevention focus than promotion focus [27]. Past research also showed that people with a prevalent prevention focus are more easily persuaded by loss-framed messages than by gain-framed messages [28]. This effect depends on the correspondence between the way persuasive messages are formulated and recipients' regulatory focus (the so-called *regulatory fit* [29]), which facilitates information processing and acceptance of the content of the message.

Framing effects of communication on healthy eating may also depend on the degree of self-efficacy of recipients, that is, the belief of being able to successfully perform a desired behaviour [30]. Some previous research [31] suggested that people with high self-efficacy are more easily persuaded by loss-framed messages than by gain-framed messages. Results of research on the link between message framing and self-efficacy have not been consistent, however, and the issue needs further exploration.

3.2. The Research Program

In our studies, we investigate framing effects of communication on healthy eating and nutrition, in order to identify which messages are more effective in activating behavioural intentions that can lead to better health and well-being among the elderly.

Participants read a short stimulus text where the positive or negative effects of a healthy or unhealthy nutrition are described in an accessible way (i.e., as a newspaper article or an interview to a physician). Depending on the experimental condition, the text describes the positive effects of healthy eating or the negative effects of unhealthy eating, describing either the effects on health (e.g., improving or deteriorating heart condition) or the effects on well-being (e.g., improving or deteriorating body fitness). Messages are manipulated also in their content, for example describing either the positive effects of a frequent vegetable consumption diet or the negative effects of a frequent meat consumption. In some studies, we also manipulate the linguistic style of the message, for example presenting the consequences of meat consumption either in *factual* (e.g., "A limited consumption of meat improves heart functionality") or in *pre-factual* (e.g., "If you make a limited consumption of meat, you will improve heart functionality ") terms.

After reading the message, participants answer a questionnaire reporting their judgments on the message itself and on its source, as well as their intention to eat certain foods (fresh and cooked vegetables, beans, white, red and cured meat, etc.) in the near future. The questionnaire also measures participants' current consumption of the same foods and their knowledge of nutrition facts (e.g., "Proteins can be found only in meat" or "Vegetable oils do not contain cholesterol"), participants' prevention or promotion regulatory focus and their self-efficacy related to eating behaviour. In particular, participants are asked to report to what extent they consider themselves able to follow a healthy diet, both generally and in some specific situations, such as when eating at home or when eating out or under emotional stress.

The initial results of our studies suggest that the participants' intention to eat more or less of each kind of food in the future depends both on the framing of the persuasive messages and on individual differences in self-efficacy and regulatory focus. Messages describing the positive consequences on well-being of limited meat consumption are more effective than messages describing the negative consequences of frequent meat consumption. The effectiveness of message framing, however, is moderated by eating-related self-efficacy. Among participants with low self-efficacy, messages describing the positive consequences of limited meat consumption reduce the intention to eat red meat more than messages describing the negative consequences of frequent meat consumption. Among participants with high self-efficacy both types of messages are associated with reduced intention to eat meat in the future, indicating that those who believe to be able to follow a healthy diet are easily motivated by both gain-framed and loss-framed messages.

In conclusion, our results suggest that the effectiveness of communication on health and nutrition aimed at the elderly depends on the fit between message framing on the one hand, and the needs and the resources of the recipients of the message on the other. Further research is needed to get to a better knowledge of how this mechanism works, assessing the effect of different messages on different categories of elderly people.

4. Enjoyment

4.1. The Background

The last approach which can be adopted to empower skills in old people consists in engaging the elderly in pleasant activities which match their interests and aptitudes so to enhance emotional, social and cognitive skills in an indirect, even though effective, way. Interventions based on music can serve as an example of such an approach.

Proposals to use the music to pursue preventive and therapeutic goals have a long history, but only recently a scientific approach has been implemented in order to assess the actual benefits derived from the involvement in musical activities [32]. A limited number of applications have been addressed to the elderly population, ranging from proposals developed to cope with problems of language, to those designed to recover motor function or the control of emotions to those aimed at the development, maintenance or rehabilitation of cognitive processes.

Within this framework it is possible to identify the specific aims of interventions based on music when they are addressed to the elderly [33]. Music enables older people to communicate through an alternative code than usual. This code typically is affected to a lesser extent than the verbal one by the effects of mental deterioration, allows a more direct access to the expressive resources of the individual and an easier emotional involvement, in partial independence from the cultural and intellectual level of the subject. It has been reported that music improves the quality of life of older people and has a motivating effect supporting the implementation of rehabilitative exercises, as it is evident in experiments conducted with patients suffering from Parkinson's disease. In stroke patients the speed of the flow of blood in the cerebral arteries increased as a result of listening to music for 30 minutes. Also, the systolic blood pressure in elderly people with dementia increased as a result of an intervention based on music. Improvements in postural stability in elderly people suffering from balance problems who had followed a musical training were found. In patients with brain injuries smoothness of gait improves thanks to exercises conducted with the support of music, as well as progress in motor coordination have been reported [34], especially if focused on acts involved in everyday life. The improvement of gait was also observed in patients with Parkinson's disease. Music was also useful in the treatment of dysarthria. In all cases in which music contributes to the recovery of motor functions, it provides a scheme of action that allows the patient to anticipate the movements to be performed.

Various musical activities proposed for elderly with dementia indicate that the experience with sounds produces positive effects on mood, restlessness, agitation, sleep disturbances and social interaction. Music can increase the production of autobiographical memories in the elderly suffering from Alzheimer's disease. Depressed patients improved relaxation, expression of feelings and emergence of reminiscences thanks to music [35]. Music is also indicated to improve social relations in stroke.

Regarding cognitive functions, it is noticed that the elderly perform better working memory task while listening to music [36]. Patients suffering from dementia, if they participate in activities of choral singing, improve their attentional capacity, as well as patients with brain damage. Särkämö et al. [37] found that daily listening to music brings patients who have suffered a stroke to improve intellectual efficiency.

4.2. The Research Program

A musical training aimed at leading older people to recover some basic mental functions has been developed [38] which is focused on the stimulation of attention, perception, memory and thinking. A set of exercises, consisting in the identification of sounds and silences or in the localization of sound sources, are aimed to stimulate the subject's attention. Exercises asking to listen to a piece of music accompanying it with the beat of the hands, with the beat of the feet or with a reciprocating motion of the hands and feet have been designed in order to improve perceptual-motor coordination. Exercises asking to provide answers according to numerical representation or to be engaged in musical dialogues have been devised to improve judgment and decision processes. A series of exercises consisting in assessing the intensity, speed, duration, pitch of the sounds were included in the training to improve perceptual discrimination and memory. To foster the ability to make associations, it was finally proposed a series of exercises consisting in linking sounds to objects, visual symbols, movements and connect musical elements with each other.

The results obtained in various applications of the training indicate that the elderly succeeded in improving their skills: significant increases were observed in the correctness of execution of the actions elicited by music and in levels of communication exhibited by the trainees. It is worth pointing out that these improvements have not been registered only in relation to the exercises included in the training, but also with different exercises: it seems that the learning outcomes produced by the training have been generalised. The overall level of attention, autonomy and participation during the sessions increased significantly as well. The modifications induced by the musical treatment do not appear to be related to the type of disease of the patients, as both psychotic, multinfartual and dementia patients benefited from the training.

The experiments carried out suggest that interventions based on music may promote improvements in the elderly. It seems that the cognitive advantages are not to be attributed to the creation of mere automatized responses, but to the development of skills that can be transferred from a domain to another one.

At present new training programs, in which music is integrated in activities based on other expressive languages (for example iconic or narrative), are under validation. Their goal is to link the leisure activities addressed at enhancing specific skills into the elderly's daily life so to be embedded in their ecological environments instead of needing a separate setting [39].

5. Conclusions

The interventions described in the previous paragraphs are clearly aimed at empowering skills which are crucial for a healthy and active ageing. Preserved cognitive abilities, as well as a reliable Theory of Mind, can help the individual to actively participate to the network of relationships in which he/she is engaged, with positive effects on the sense of self-efficacy. Therefore, figuring out trainings to support these skills in order to postpone the beginning of their decline may have a relevant adaptive value for the quality of life of the elderly population. Such skills should allow the person to explain and interpret the world around him/her and to

manage him/herself in adequate ways. For instance, in the economic and financial domain it is crucial to ensure that the individual avoids bad choices and decisions or, even worse, falls victim of ambiguous promotional messages about possible investments of money, if not actual frauds. The same is true in the field of food choice and health self-care. Training intervention involving old people can be useful to protect them from the risks of misguided choices. In order to achieve these goals, specific cognitive and social abilities, both general and domain-specific, are needed and the approaches previously outlined can empower them.

The elderly is exposed to social pressure which can undermine his/her ability to make autonomous and healthy decisions. Thus, the empowering of personal skills should be mirrored by actions in the environment aimed at providing cues signaling which are the proper behaviors to be held. In this sense, effective communication may contribute to the activation of cognitive and motivational resources in daily choices and activities that have positive effects on well-being. Results coming from the investigation of the effects of communication on health and nutrition contribute to highlight which characteristics of the source, the message and the recipients should be taken in consideration when designing communication on these topics. As an example, studies provide information on how messages regarding nutrition can affect recipients' intentions and behaviour depending on their framing. Furthermore, they provide information on individual differences that affect the reception and processing of messages. Thanks to the results achieved in this area of research, policy makers may be able to create effective communication campaigns to promote healthy behaviour among the elderly. In addition, guidelines developed for the creation of effective communication could be extended to a variety of contents and contexts in order to promote health and well-being using communication specifically designed for the elderly. Finally, it is worth noting that both the research aimed at enhancing personal skills and that addressing the interaction between the individual and the environment may inform clinicians and health care professionals on novel treatment protocols to promote well-being. It may also lay the foundation for effective prevention and early-intervention practices that might, in turn, lighten the health burden.

Each approach which has been shortly outlined relies on different grounds and implies different assumptions about how the target of the interventions has to be meant. In order to elucidate the differences existing among them, we can stress how each approach conceives *who* is the subject who should benefit from the intervention, *why* he/she is engaged in it, *what* he/she is asked to do in order to empower his/her skills and *where* the intervention usually takes place (Table 1).

Table 1. Sketch of the features of the four approaches

Approach	Who	Why	What	Where
Neurostimulation	executor	explicit goals	structured tasks	well-defined settings
Theory of Mind	reflective agent	explicit goals	structured tasks	well-defined settings
Communication	social agent	implicit goals	open jobs	ill-defined settings
Enjoyment	expressive participant	explicit goals	structured tasks	ill-defined settings

The elderly whose skills are to be empowered can play different roles within the interventions (*Who*). They may be asked to perform a series of activities according to given instructions (stimulation) or they may be prompted to reflect on the mental processes which are involved in the interactions they carry out (Theory of Mind); the degrees of individual autonomy can increase if, given some notions appropriately devised, he/she is let free to decide how to manage him/herself in everyday life (communication), having also the possibility to enrich the environment in which the intervention takes place thanks to personal contributions (enjoyment). In some cases the reasons underpinning the intervention (*Why*) are made clear to whom is engaged, whereas in other cases they are not explicitly revealed. The intervention can consist (*What*) of pre-established exercises or open tasks so to match the common life jobs to a different extent. Finally, the intervention may occur (*Where*) in places specifically addressed to the training (laboratories, ateliers and so on) or in the environment where the individual usually lives.

Each feature shared by a kind of intervention has its own strengths and weaknesses. Specific tasks, well-focused requests, clear-cut instructions and highly structured environments ensure that we are addressing the relevant mental processes and confounding variables should be excluded. There is, however, the risk that the trainees develop a dependence attitude and are prevented to express their potentialities in an individualized way. By converse, open-ended activities and ecological settings should elicit personal motivation and increase the likelihood of generalizing the beneficial outcomes of the empowerment programs. They may, however, lack of control of what is actually occurring across the training. Hence, the goal is not to identify the best practice in absolute terms, but rather to becoming aware of the pros and cons of each approach, so to choose the kind of intervention which is most suited to the elderly to whom the intervention has to be addressed, taking into account the features of the context and the actual resources which can be employed.

The further step of our program is to figure out how different approaches can be integrated so to devise a holistic intervention in which synergies among the methodologies to be applied occur. As an example, the consonance of the observed effects of treatment-induced cognitive enhancement with the perception that participants reported about the general improvement of their performance and their living conditions (life quality in term of relational activities and daily living) suggested that the stimulation of specific mental processes can result not only in the improvement of such processes, but also in a general increase of the level of motivation, self-efficacy and social participation. Furthermore, the possible positive effects of experiences aimed at enhancing Theory of Mind and decision-making skills not only on the subject directly involved in the intervention but also on his/her social partners supports the external relevance of future programs in such a direction.

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