

## Problem Deficit Theory of Mind in Geriatric Patients

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### Abstract

The analysis of foreign and own studies Theory of Mind - the ability to understand the mental states of themselves and other people in elderly people. It is shown that the mental model (theory of mind) is a new paradigm of cognitive psychology, effective for the analysis of late ontogeny. This paradigm has its own specificities and differs from the paradigm of social cognition. It argued the hypothesis that the Theory of Mind is the mental mechanism of social cognition, differentiated features of these paradigms. Generalization of researches cognitive and affective components, Theory of Mind in elderly and senile age have shown that this ability did not change totally. There is heterogeneity of mental ability to understand the psychological world with a greater degree of safety emotional component. The factors that affect the efficiency of Theory of mind were extracted in elderly persons (methodological, neuroanatomical, cognitive, psychosocial). We described the development strategies Theory of mind in aging.

**Keywords:** *Theory of Mind; Old Age; Heterogeneity of Changes; Cognitive Component of the Theory of Mind; Affective Component of the Theory of Mind*

### Introduction

Productive aging is largely connected to the existence of social capital: social circle, a person to confide in, emotional support, social interactions, significant social activities [1]. Social capital acts as an everyday-stress “buffer”, helps decrease uncertainty in the elderly years [1,2]. Having emotional support in elderly years plays an important role in maintaining somatic and mental health [3]. If a person with Alzheimer’s or Parkinson’s disease has somebody to confide in, the risks of dysfunctions decline as well as a drop in suicidal tendencies can be seen [4]. Absence of emotional support in elderly years is closely related to high risks of heart failure complications, after suffering a stroke or undergoing surgical operations [1].

Aging brings about changes in social interactions and the intrinsic emotional circumstances around them. An elderly person starts showing selective motivation towards different forms of social activities. They arbitrarily structure their social network focusing on trustworthy relationships and shielding themselves from negative and traumatic experiences [5]. L.L. Carstensen has proposed the Socio-emotional Selectivity Theory. She assumed that it is not the chronological changes that lie at the base of the alterations in selecting and structuring social contacts but rather awareness of time. Elderly people reconsider perceived future time, which in turn brings a massive shift in goals - from cognitive to emotional.

Despite the narrow socioemotional selectiveness the elderly person interacts with other people and confronts situations which require understanding of intentions, truthfulness, beliefs and emotions of other people - in other words, where it is necessary to “read” hidden and indirectly implied mental states of other people. The ability to perceive and subconsciously understand psychological states

(thoughts, feelings, beliefs, intentions, desires, emotions)of self/ of the Other, in order to explain or predict the behavior and build effective communication is called the theory of mind (later ToM) [6]. These difficulties may be connected with the growth of vulnerabilities in the ToM, which influence socioemotional functioning [7]. The level of life of the elderly person hugely depends on socioemotional functioning - expressing personal feelings and thoughts to the Other, being able to interpret thoughts and feeling of the Other, showing empathy, effectively managing proper emotions, building the right communication strategies adequate for given social circumstances. Ability to understand mental states in elderly years makes a considerable contribution to social life [8]. There are differences in the behavioral models of elderly and senile people [9]. According to various sources, changes in the ToM are starting to show from 55 - 65 years [10]. An elderly person can start having difficulties understanding other people’s mental states, motivations and needs. Elderly people often misinterpret psychological states of unknown people, they find it harder to appreciate untrustworthy people, they tend to trust strangers and, therefore, they fall victims to swindlers more often [11]. The disconnection between one’s own ideas and other people’s ideas may affect self-help in decision making, lead to misunderstanding, conflict escalation and violation of social interactions, which furthers the growth of psycho-sociological problems and leads to social isolation [8]. Those difficulties may lead to a decrease in social activity, estrangement from significant people which results in feelings of increased loneliness and being shunned, increases the risk of developing a range of somatic and psychological disorders with further deterioration of health possibly leading to disability [8]. Therefore, the estimation of the presence and deficit level of ToM in elderly is a fundamental diagnostic criterion with the aim to effectively treat and rehabilitate elderly and senile people. For instance, the American psychiatric association included deficit of ToM as one of the criteria for diagnosing neurocognitive disorders in DSM-V [12].

However, while discussing this ability and its role in people’s social life the question of the relation between the ToM and social cognition often rises.

**Theory of mind and social cognition**

Theory of mind is a system of conceptualization of knowledge about the mental state of self and others which allows analyzing the person’s inner life [6,13]. Understanding proper mental state as well as that of ‘The Other’ is the basis of social cognition, social interaction [14]. Table 1 outlines the key differences between ToM and social cognition.

| Theory of mind   | Social cognition  |
|--|---|
| <b>Concept</b>   |   |
| A complex socio-cognitive process which allows to understand the mental state of self and others as well as permits a conclusion about other person’s thoughts, plans, ambitions.  | Social cognition describes how social information is decoded, how it is stored and extracted from memory, how social knowledge is structured, which cognitive processes are involved when a person forms an opinion of other people. It describes how the person shapes a judgement about other people’s mental states. |
| <b>Components</b>  |   |
| <ul style="list-style-type: none"> <li>• Socio-perceptive component</li> <li>• Socio-cognitive component                             <ul style="list-style-type: none"> <li>• Cognitive “cold” component</li> <li>• Affective “hot” component</li> <li>• Conative component</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Social perception</li> <li>• Empathy</li> <li>• Casual attribution</li> <li>• Recognition, differentiation of emotions</li> <li>• Theory of mind (ascription of a mental state of another person, metallization)</li> </ul>  |

| <b>The focus of the analysis</b>  |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. The focus of the analysis is on the inner psychological mechanisms (conceptual possibilities of understanding mental states of self and other people)</li> <li>2. The Other person is not seen as a part of a social group but rather as a simple carrier of the mental.</li> <li>3. The reasons for understanding behavior of the Other lie in the mental models and the levels of its organization.</li> <li>4. The emphasis is on interpreting mental states of the other person in different contexts.</li> </ol> | <ol style="list-style-type: none"> <li>1. The focus of the analysis is on the outer psychological mechanisms (interactions between social objects and groups).</li> <li>2. The Other person is seen as a part of a social group.</li> <li>3. The process of behavioral interpretation opens through the analysis of the personality of both the perceiving and the perceived, circumstances, objective conditions, motivation and needs.</li> <li>4. The emphasis is on interpreting visually represented components of the other person's behavior in/within group.</li> </ol> |
| <b>Object</b>   |   |
| Understanding of mental states and their consequences, which contributes in predicting the other person's behavior.   | Social interactions   |
| <b>Functions</b>  |   |
| Understanding and recognition of mental states of another person and a group and its organization into mental models in order to maintain social competence.  | Effective interactions within a group   |

**Table 1:** Comparative analysis of ToM and social cognition.

From table 1 it is obvious that the theory of mind is aimed at studying the recognition and understanding of mental state; their organization into cognitive models (singular, situational and non-situational) depending on the context. In socio-psychology social cognition serves as a condition for person's interactions within a group where interactions are based on taking into account individual orientation, habits, and casual attributions. ToM may be considered a foundational mental component of social cognition. Interactions between people are impossible without understanding the ToM of the other person and the ability to look at the situation from different points of view. When comparing personal ToM with the ToM of the other person in the given situation, the ability to not only observe but also understand mental states helps people explore the world around them and carry out more productive social activities [14].

ToM permits to disclose cognitive mechanisms of understanding in interpersonal interactions because the process of socializing is based on constant monitoring and comparison of mental states and events. A person needs to interpret and foresee mental states of the other person. In this case, while examining the ToM and the mental mechanism of social cognition it is necessary to point out that it is aimed at studying the inner psychological states of the other person. The attention is focused on the individual conceptual world of a person [14]. ToM is comprised of the following components (See table 1) [4,15]:

- Cognitive component: The ability to recognize beliefs, false opinions, thoughts, deception or irony, cognitive component of empathy. It provides the skills needed for manipulating and deceiving the interlocutor or irony regarding a person or situation. Dorsolateral prefrontal cortex is in charge of the effectiveness of this component. It is also responsible for executive functions and working memory.

- Emotional component: The ability to recognize and understand emotions and feeling of another person. It plays a role in pro-social behavior, ability to console the Other and help solve a problem, the emotional component of empathy. It is secured by ventromedial prefrontal cortex which takes part in the processing emotions, making decisions and regulating social behavior.
- Conative type theory of mind belongs to the forms of social communication when one person is trying to influence the mental and emotional state of the other person [15].

### Theory of mind in elderly and senile age

Studies of the ToM in elderly age indicate deficit of this ability. However, it is not enough to speak of the deficit of the ToM in elderly and senile age, it is necessary to take into consideration some compensatory mechanisms: crystallized intelligence, emotional intelligence and the skills of interpersonal understanding [4]. On the other hand, the changes in the ToM happen heterogeneously: there are different trajectories and dynamics of transformations of the affective and cognitive components in the elderly age [16,17].

The problems of the ToM are not total/absolute; they are selective. For example, elderly people with Alzheimer's disease can recognize other people's emotions; however they have difficulties in recognizing false beliefs. Regular everyday socializing at elderly age is connected to the cognitive component of the ToM. At elderly age the cognitive component of the ToM is mostly affected by changes. This can be explained from different perspectives. For instance, at elderly age people avoid dangerous, negative social interactions due to the fear of being deceived.

The affective component of the ToM at elderly age stays intact longer thanks to the preservation of various life interests and hobbies [13]. Bottiroli and E. Cavallini showed that there is a divergent trajectory in decline of the affective and cognitive components of the ToM, with aging affecting the cognitive component more than the affective one [13]. This research is interesting because it gives the possibility to compare the dynamics of changes in the ability to rationalize and the ability to recognize, understand emotions. Nonetheless, most of the studies of the ToM in elderly years focus on either the cognitive or the affective component which often leads to contradictions [18].

### Cognitive component of the theory of mind in elderly years

A pioneering study in the field of the ToM in elderly years was carried out by F. Happe. She studied the cognitive component of the ToM. The participants were asked to read a story and tell what the protagonist thinks of the mental state of the other character. And even though the elderly respondents took more time to do the task than the young ones, the results were better for the elderly group. She reckons that wisdom and deep social intelligence at elderly and senile age influence the ToM [4,19]. Elderly people demonstrate an evident priority in perception of social and emotional information [3]. Research [20] has shown traces of decrease of the cognitive component in elderly years while solving tasks on identification, double bluff, irony, deception, complex false beliefs [21]. Other studies show absence of age-specific differences in the cognitive component of the ToM with the tasks related to understanding false beliefs of the first category where only one perspective of a character should be understood [18]. S. Bottorilia and E. Cvallini carried out an estimate of the cognitive component of the ToM using a test detecting tactlessness on elderly and senile respondents [13]. Our studies have made it evident that elderly respondents (55 - 60) detect deception and irony in narrative stories better than the senile ones (61 - 74 and 74 - 90). An elderly person uses their understanding of false beliefs and deception about the mental state through their personal experience in order to construct an appropriate paradigmatic interpretation of the situation [4].

### Emotional component of the theory of mind in elderly years

According to some studies the emotional component in elderly years remains [20,22]. The last work by S. Battirolia and E. Cavallini demonstrated that while doing tasks on emotion recognition elderly people make less mistakes than the young ones [13]. However, some

scholars [19] reckon that there are difficulties in emotional recognition and differentiation [18,23], especially for complex emotions [24]. Our studies have proved that by senile age (75 - 90 years) the ability to recognize emotions from people's faces decreases. Recognition of negative emotions (sorrow, fear, anger) suffers more than that of neutral and positive (happiness). Presence and the level of cognitive deficit, depression in elderly years effect interpretations of emotions by their expression [4].

### Factors influencing the theory of mind in elderly years

- **Methodological factors:** Socio-cognitive paradigm which is used in standard experimental tasks is not sufficient for elderly and senile respondents; especially concerning the question of the interaction between an elderly respondent and the interviewer who serves as a stranger. Elderly people may be less motivated [10]. It is necessary to take into account that aging is accompanied by a shift in social motivation, which has to be considered while studying the specifics of understanding mental states of other people at elderly age. The variation in the obtained results concerning the ToM hugely depends on the type and the modality of the tasks (verbal, visually static, visually dynamic type). Solving verbal tasks is better in elderly years, which shows the importance of the verbal ability for the elderly, which remains consistent throughout old age [4]. Elderly respondents make more mistakes in tasks with static and dynamic visual stimuli as well as in non-verbal tasks. Some studies show that visual stimuli used for studying the affective component may cause complications in elderly years [19]. C. Duval and his colleagues used the visual type of task "Reading the Mind in the Eyes" and proved that there is an improvement for performing this type of task at elderly age [16] with colleagues used the visual type of task "Reading the Mind in the Eyes" and showed that in elderly years there is an improvement in performance of this type of task [16]. Wang and Su used verbal emotionally-charged stories in their study and did not find any differences in the affective component in elderly years [11]. H. Rakoczy, A. Harder-Kasten demonstrated video-tasks where conclusions about the character's feelings were to be made based on a video fragment. An improvement in recognition levels of emotional states for this type of tasks was demonstrated in elderly people [17].
- **Neuroanatomical factors:** Aging is connected with nonlinear decline in gray matter, changes in gray matter. Decline in gray matter influences the performance of the cognitive functions [25]. IN normal aging decreases the volume of premotor cortex, gyrus frontalis inferior, insula, gyrus temporalis superior. A reduction in connections between lobus frontalis telencephali and lobus temporalis occurs. Aging brings about natural changes in dorsolateral prefrontal cortex which plays a significant role in securing understanding of the mental state of the other person (cognitive component) and at the same time ventromedial prefrontal cortex takes part in understanding feeling and emotions of other people (affective component) [23]. Patients with ventromedial prefrontal cortex injuries show changes in the affective component, whereas dorsolateral prefrontal cortex injuries lead to changes in the cognitive component. Changes in dorsolateral area occur more often than in the ventromedial. Nonetheless, there are compensatory neuronal mechanisms which reduce age-specific cerebral changes. Activation of some of the neural areas may help maintaining understanding mental states. For example, bilateral language areas.
- **Somatic factors:** A.L. Fischer established that presence of cardio-vascular diseases with comorbidal burdeness make a significant impact on cognitive functions. Pronounced degrees of heart failure cause difficulties in understanding emotions and recognizing mental states of other people [4,16].
- **Cognitive factors:** Various trajectories of changes of development of cognitive processes can be observed while aging. For example, self-regulation, emotional functioning stay intact and may even improve in elderly years, which proves the socio-emotional selectivity theory [3]. Understanding mental states requires participation of the following cognitive processes: working memory, episodic memory, cognition, speech [17]. Executive functions are the predictor of the ToM [10]. Executive functions consist of inhibitory control, working memory, changes of the attention target and verbal fluency. The processes of braking control and

renovation/restoration of the working memory are more vulnerable in elderly years and they have an impact on securing the cognitive component of the ToM [21]. This presumes slowing down of proper perception and renovation of the information about the characters, their mental states in order to identify the ToM of the Other correctly.

- **Psycho-sociological factors:** The efficiency of understanding of mental states of self and the other in elderly years is influenced by: perception of the future, feeling of loneliness, social avoidance and presence of support [4,5,13,17]. Decline in the number of interactions, detachment may be a factor that influences the decrease in the cognitive and not the affective component in understanding mental state of the others [13]. Even if an elderly person is socially active, they are involved in social exchange with a close circle of people [4]. If an elderly person has regular social interactions with new people they develop their communication skills and this in turn has a positive influence on the cognitive component of the ToM. Elderly people suffering from depression, anxiety, grief experience difficulties in understanding mental states of self and the others. L. Pezzuti and E. Longobardi in their study showed that depression in elderly years affects the ability to understand reason-and-cause social connections (causal connection), verbally express emotional states (psychological lexicon). Elderly people with a major depressive episode experience serious difficulties in understanding mental state, recognizing deception and irony [13].

### Ways of improving the theory of mind in elderly years

A group training programme of strengthening the ToM in elderly years is meant to develop understanding of mental states of other people. Two approaches are used to teach the elderly recognize mental states of others [26]:

- **Communicative approach:** Communication helps elderly people understand that different people have different points of view on the same situation. Training is used as a platform to compare different points of view - one of self and of the Other [26]. It is especially important because elderly people who are more particular in their social interactions show decline in everyday social interactions [9].
- **Dynamic approach** is based on the belief that mental states are not static but dynamic and may change with time. Teaching about the dynamic nature of mental states is important because it allows making proper position more flexible, adaptive to social context. The programs stresses out that if in everyday life elderly people are socially active, involved in family life and are communicative with friends or trustworthy people, this will lead to them forming different views on situations through discussing rather than judging, in other words, the ability to look at the same situation from different angles.

The training consists 5 - 10 group sessions of 6 - 8 people lead by two coaches (psychologist/psychiatrist and a social worker). Training includes the following stages [4]:

- **The first stage:** Teaching understanding mental states of the Other. It includes using stories/narratives that give the opportunity to effectively draw conclusions about complex mental states, take into account the dynamic of changes in those states depending on the context.
- **The second stage:** Teaching expressing and understanding mental states of self and the Other. Development of effective usage of verbs expressing proper mental state and that of other people [27-33].

### Conclusion

- Theory of mind can be seen as a mental mechanism of social cognition. ToM gives the opportunity to study individual conceptual world of a person, disclose cognitive mechanisms of understanding in interpersonal iterations because the process of socializing is based on constant monitoring and comparison of mental states and events.

- In senile age/with age people may become less involved in social interactions, a decline in social functioning can be seen which leads to selectiveness in understanding the other person's mental state. There is a connection between the mental state and desire to improve social interactions. Providing there is high motivation in the elderly and senile age more resources are used to regulate/balance emotions and utilizing effective coping strategies which make interactions with other people possible as well as keep subjective well-being.
- In elderly and senile age a clearly manifested decline in the functioning of the cognitive component of ToM can be seen: understanding tactlessness, double bluff, irony, deception, complex false beliefs.
- Changes in the affective component take place at a slower pace. By senile age (75 - 90 years) the ability to recognize emotions by people's faces declines - mostly identification of negative emotions (sorrow, fear, anger) rather than neutral or positive ones (happiness).
- Deficit in the ToM in elderly age is not total/absolute. In elderly and senile age divergent trajectories of decline of the affective and cognitive components of the ToM can be seen, with the better preservation of the affective component.
- Understanding of the mental state of self and the Other in elderly and senile age is influenced by a number of factors: methodological, neuroanatomical, somatic, cognitive, psycho-social.
- Components of the ToM may be developed in the elderly and senile age with the help of a group training program. It is aimed at teaching to understand simple and complex mental states, building up the vocabulary of mental states, teaching the skills to reduce conflict situations during social interactions.

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