The Function of Cognitive Architecture in Individual Development During the Process of Identity Search in Social Media

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Abstract: As social media has penetrated into people's lives, it is almost inevitable for people to acquire information from social media. Identity construction requires information related to self, and it is a crucial step in one's psychosocial development. This research delved into identity construction in a social media context via a cognitive architecture perspective. In this paper, analysis of identity construction is based on an identity construction model, including three types of identity construction are proposed. The environment social media has provided to each type of identity construction and the distinct aspects of cognitive architecture behind those identity constructions are identified. Suggestions for individuals on the usage of social media in order to maximize the identity relevant information processing are given based on the identified role cognitive architecture plays in different styles of identity construction.

1. Introduction

In recent years, social media has penetrated into people's lives. In 2020, there are estimated to be four billion active social media users worldwide, with more than half of them using Facebook [1]. People living in the digital age are inextricably linked to social media, in which people experience social development differently from the real world.

Identity search is a crucial step in one's development. Identity and role confusion are the fifth psychosocial crisis according to Erikson's stages of psychosocial development which normally occurs between the age of 12 to 18. Self-identity is defined as a sense of self, and such sense is shaped by the social regard of a person [2]. As Erik Erikson suggested, personal growth and society are inseparable. They are two factors that are interwoven to define a person [3]. While forming the perception of "who am I", in other words, the process of identity construction, the social role is a critical consideration. That is, the idea of self and society combined to create one's identity [4]. Meanwhile, social media can be seen as a part of society where people communicate, connect and maintain relationships. People's identities are more visible on social media. Tweets, likes, retweets, and profiles allow people's identities to be vivid and public in the society. This means that social media can provide a robust illustration of an individual. Therefore, for people who live in a digital age, social media is key to an individual's search for identity.

The process of constructing an identity on social media involves information processing. Human cognitive architecture is associated with such function. That is through consuming information at first glance to integrating information into one's own perception - cognitive architecture plays a crucial role. Cognitive architecture mainly consists of four elements: working memory, long-term memory, schema construction, and schema automation [5]. In order to understand the whole process of searching for self-identity on social media, both the psychosocial perspective and the cognitive perspective should be considered.

Though there are vigorous studies on social media and individual development, identity search during development as well as cognitive architecture and information processing, little research has been done to examine the function of cognitive architecture during the search for identity on social media. The purpose of this study is to fill this gap. This paper includes five sections: introduction, literature review, discussion, suggestion, and conclusion. In the literature review section, traits of identity search in individual development, social media's impact on one's identity, and concept of cognitive architecture, will be explained. Interaction of social media, identity construction, and cognitive architecture based on three types of identity search will be presented in the discussion section. In the suggestion section, individuals will be given suggestions on the usage of social media in order to optimize information processing. This paper will provide an urge for future works and point out the limitation in the conclusion section.

2. Literature review

The previous studies were conducted to examine the characteristics of psychosocial development regarding identity search. Firstly, people tend to conform to a peer group. They tend to actively seek out a variety of groups and fit into the group. Meanwhile, individuals who try to fit in adopt the values and norms of the group, making themselves more aligned with the members of that group. People prefer to be grouped with their peers most of the time, especially adolescents [6]. Moreover, Sturdevant and Spear suggested that adolescents may experience identity confusion [7]. During psychosocial development, people tend to try various lifestyles in order to find the one that is most recognized; many of those styles may include risky behaviors.

Social media has proved to have impacts on such psychosocial development. As aforementioned, identity refers to a sense of self. Appearance can be the most direct sense of one's self. It is also the easiest for one to observe. There are increasing concerns about social media causing young girls to have body dissatisfaction, as a result leading to reduced life satisfaction and eating disorder symptoms. Rather, this outcome stems from intense peer competition brought about by use of social media. The term peer competition in the paper denotes the feeling of being inferior to others on social media. That is, by viewing others' posts on social media, one develops low self-esteem. A study indicated that social media use is strongly correlated with peer competition instead of body dissatisfaction. However, peer competition is a robust predictor of it. There might be a potential competition or imagined competition for romantic partners between teen girls. As a result, the successful individual may cause low satisfaction to other girl competitors. In addition to the romantic competition, young girls like to compare themselves to their higher-status peers. This higher status can be more impressive in appearance, academic excellence, or receiving more attention. Because of the public nature of social media, girls are more likely to be exposed to such information, which leads to stronger comparisons and dissatisfaction [8].

Human cognitive architecture provides a basic structure for human cognition. That is, although each individual's cognition differs in nature, there is the same rationale behind it. Such rationale includes several mechanisms such as the way humans generate, process, and alter information [9]. This paper mainly focuses on the structure of working memory, long-term memory, and their interaction. Long-term memory stores knowledge. That knowledge enables humans to perform

skillfully as an expert in problem-solving. Working memory mainly processes novel information. It has a limited capacity when there is no previous or relative knowledge obtained by an individual. The reason for such constraint is to ensure any alternation to the knowledge stored in the long-term memory will be effective and cause minimal interference to the store's functionality. Specifically, perceiving novel information is to alter the knowledge structure in long-term memory. Such alternation should be done by a small and gradual amount of novel information perceived each time. Each change should be tested for its effectiveness regarding functionality. Therefore, working memory capacity is limited to ensure no one-time large change can destroy the original knowledge base [9]. Schema is a feature of long-term memory. Knowledge is represented by schemas as patterns or relationships of elements derived from experience [10]. Schema can be retrieved from long-term memory to working memory in order to alleviate working memory's workload. As aforementioned, working memory capacity is limited, but the same cannot be said for processing previously learned material. That is, working memory can only process one single element, then the lower-level related elements will be brought from schemas. In that case, working memory load is relieved. Automated processing occurs when schemas have high interactivity. With automation, one can process familiar information unconsciously without working memory, thus further alleviating working memory's burden [11].

This article's analysis of cognitive architecture's role in identity search on social media is based on three types of identity construction proposed by Berzonsky [12]. The three types of identity construction are informational processing style, normative processing style, and diffuse-avoidant style. The informational processing style of identity construction is characterized by using one's own reasoning to form identity. Tendency to follow a collective principle to form a sense of identity is the trait of normative processing style. Individuals who adopt a diffuse-avoidant style of identity construction would like to have their identity determined by situations, in which rewards and demands shape those persons' identity [12].

3. Discussion

3.1. Identity Formation

Forming identity is equivalent to building a theory. The theory is developed through observations, hypotheses, tests, and results. After forming the theory, an individual also needs to adjust and refine the theory in response to the emergence of new information. During the observation phase, the composition of identity is mainly determined by the environment, for example, family, peers, and society. To formulate a hypothesis about identity is to add an individual's own discretion to the identity shaped by the environment. The process of experimentation is completed by trying out different identities in different situations to arrive at the identity that one feels most comfortable with. Ultimately, the individual arrives at an identity that is shaped by both the environment and his or her own perception of himself or herself. This identity may also be challenged later in development. In the face of the new context or perception, the individual needs to adjust in a new way in order to acquire a renewed identity.

3.2. Informational Processing Style

The three styles of identity formation discussed in this paper highlight the different stages of theoretical formation. The information-processing style acquires identity primarily by formulating hypotheses. In other words, informational-processing-styled individuals use information gathering, obtaining an accurate self-diagnosis, and continuously assimilating new knowledge to acquire an identity. What's more, individuals who adopt this type of identity construction are cautious about their decisional strategy.

In social media, there is ample information and identity-related content for one to obtain. Therefore, while spending time on social media, individuals who have adopted the informational processing style of identity construction are provided with a variety of self-relevant content [12]. The process of identity construction may be granted with more choices given the rich-information environment. However, the information provided by social media can be overwhelming. This requires individuals to selectively absorb information in order not to overload their working memory capacity. Working memory capacity has been proven to be limited, and working memory is correlated with attention. First, working memory has a limited maintenance time and volume, holding only seven plus or minus two pieces of information at a time [5]. Second, working memory capacity predicts attentional focus. Higher working memory capacity is positively associated with greater attentional focus and distraction resistance [13]. That is, working memory capacity helps individuals grasp the information they need in a noisy environment. For information processing individuals, the information they need is on personally relevant content. The more relevant the content is to one's identity, the faster the individual's response time [14]. This finding helps confirm that working memory capacity helps individuals grasp identity-relevant content in the noisy information environment provided by social media.

Another feature of social media content is that the content is generated by users. Therefore, the authority and credibility of the information are compromised by the diversity of information. In addition, information-processing individuals are very cautious about the decisions they make. This can be interpreted as their need to use accurate information to obtain an accurate perception of their identity. At the same time, their acceptance of alternative ideas is based on the need for accuracy and criticality of ideas [12]. Therefore, information-processing users need to have goals in searching for information on social media, which is judging the accuracy of the information, i.e., its relevance to their identity, and the quality of the information. This process is a means-ends analysis. This analysis is characterized by thinking of means to an end through an established purpose. This process is extremely demanding in terms of cognitive effort. Because individual needs to keep the goal in working memory, use reason and rationality to analyze the possible means, the link between the means and the goal, and other secondary goals [5]. For qualified information to be retained in this process, individual needs to categorize, organize, and integrate the information. Such process allows the information to interact with the current identity, stored in schemas in the long-term memory, and thus determine whether an alteration in identity is possible. But having the schema held in the long-term memory alleviates the burden on working memory that comes with the means-end. This is because compartmentalizing different already approved information into different schemas can help individuals develop systematic information processing instead of random search.

3.3. Normative Processing Style

Individuals who adopt a normative processing style of identity construction stress observation to a great extent. Normative-processing-styled individuals' identity is determined mostly by others and groups. Normative processing individuals strictly adhere to the values of the social groups in which they live and internalize the values into their own identity. That is, the characteristics of the members in a group largely determine the identity of the normative processing individual. These individuals make little judgment about the adoption of these norms. That is, their internalization of the group's principle is in a mindless manner. In order for their mindless internalization to take place, normative processing individuals have a strong need for the structure of information and often seek self-confirming content. This structure includes clarity and certainty of information. Structure enables individuals to maintain their self-view and resist information that may threaten their identity [12].

People have an innate desire to socialize and fit into groups, and social media platforms enable sharing with groups regardless of time, place, and distance. In the social media context, community

links are further strengthened. Social media platforms improve attention among members and this is an important factor in enhancing community connectivity. By mentioning and retweeting posts, members can feel the attention and recognition of other members [15]. The enhanced community interaction helps normative processing individuals to attach to the community. In addition, the openness and diversity of information in social media provide these individuals with more information to form a strong identity structure. At the same time, the communities established on social media help individuals avoid the exclusion that would result from complete exposure as in real society. That is, the virtual community overcomes some of the physical barriers and unspoken rules of the real world such as voice, physical appearance, sexual orientation, biological and social gender. Normative processing individuals can take advantage of this to find more communities that fit their interests.

The structured view of self and self-confirming information-seeking behavior can be explained by the mechanism of long-term memory. First, the process of formation of structure is building schema. In the normative processing style of identity construction, a strong structure is the formation of a considerable well-developed schema. Information regarding identity is systematically stored in the schemas of the individual. As aforementioned, the information contained in the schema comes from belonging and commitment to the community. The schemas create the perception of the self, that is, identity.

When a well-established and systematic schema is in place, individuals develop automated thinking. It works by accepting what is relevant to the schema and rejecting everything else that is not connected. Thus, normative processing-styled individuals are more inclined to look for content that affirms their point of view and to defend themselves against information that may threaten their self-perception by forming a powerful schema. In addition, because automated thinking is unconscious, its processing of information requires little working memory capacity [5]. This also contributes to normative processing-styled individuals' mindless adhering to the group's goals and values.

The characteristics of long-term memory also explain an individual's need for clarity and certainty. In order to systematically form a schema containing multiple elements, information processing in long-term memory can only extract similarities and commonalities. However, there are almost no two pieces of information that are identical in detail. Therefore, the information stored in the schema is lacking in detail. Hence, for automated processing to accurately incorporate relevant information, normative processing-styled individuals cannot accept complex descriptions as well as vague meanings.

3.4. Diffuse-avoidant style

The diffuse avoidant styled individual is characterized by having one's identity influenced by the immediate situational responses. Unlike the normative processing style of identity construction, the diffuse-avoidant individual is more disorganized. There is no structure in their identity acquisition process. They also do not have a strong sense of belonging and do not conform to groups. Diffuse avoidant individuals lack structured and consistent beliefs about identity formation. They are avoidant in their acquisition of information. That is, they do not actively obtain information to form a perception of their identity. This also contributes to the fact that their identity is influenced by immediate situational feedback. Therefore, avoidant individuals have a confused self [16]. In addition to the susceptibility of situational feedback, diffuse avoidant individuals procrastinate when facing challenges of identity. Such procrastination is characterized by self-handicapping behavior. That is, through the act of self-imposed barriers, individuals are able to rationalize and excuse the negative feedback they receive and the mistakes they make [12].

The environment that social media provides to diffuse-avoidant individuals is immediate feedback on the situation. With the like button and comment function, the individual can clearly understand the contextual feedback. This feedback is equivalent to a social cue. For example, for the like button, it means more than just indicating that the user likes the content being liked. Sometimes the like also indicates a relationship. For example, by frequently liking a user's posts, the liker indicates a favorable attitude toward that user. In addition, likes also have a support function. Users often like posts with charity content. This act of liking is not an expression of liking the content, but rather an expression of support and compassion for the person in the content. Thus, the like function brings a variety of social feedback to diffuse-avoidant individuals [17].

The relationship between cognitive architecture and diffuse-avoidant identity construction is relatively ambiguous [12]. However, the relationship between the behavior of some diffuse-avoidant individuals on social media and cognitive architecture can be derived from the characteristics of media multitaskers. As aforementioned, social media has penetrated into people's lives, and provides a great deal of information to people. Therefore, multitasking is almost inevitable. Since both informational-processing and normative processing identity-forming individuals have a clear understanding of the composition of their identity, they retrieve information purposefully, that is, they focus on specific information with attention. However, since diffuse avoidant individuals do not have a structured perception of identity, acquiring identity-relevant information is overwhelming for them. This may lead them to become high media multitaskers. High media multitaskers are often easily distracted by irrelevant information and memories. First, working memory plays a trivial role in the identity formation of diffuse-avoidant individuals, since one task of working memory is to manage attention. Being easily distracted by irrelevant content is an attention deficit. In addition, the inability to ignore the interference of irrelevant memories reflects a confused schema in addition to work memory failure. Because of the confusing schema, the individual's long-term memory fails to bring the correct relevant memory into the working memory.

3.5. Suggestion

For the above three types of identity acquisition, this section will provide theoretical-based suggestions to make the process of identity acquisition smoother for individuals. This section will also suggest possible social media skills that can be used to maximize the accuracy and efficiency of information acquisition.

Regarding the informational processing style of identity construction, individuals who adopt this style face the challenge of overwhelming information and vague content. The mass and vagueness of information make working memory mostly diverted to processing the description of the information and picking the optimal information rather than to directly accessing the content of the information. In addition, as aforementioned, the mean-end analysis approach to problem-solving is particularly taxing on working memory. Therefore, informational processing individuals may not have sufficient cognitive resources to form schemas. The schemas for identity construction are the individual's perception and comprehensive understanding of identity. For information-processing individuals, they want to be able to self-diagnose their identity, and the prerequisite for diagnosis is based on adequate knowledge [12]. Therefore, the information complexity in social media may hinder the process of identity diagnosis.

In such cases where working memory is not fully engaged in the most central tasks during problem-solving as well as learning, research has demonstrated that individuals can improve the accuracy and efficiency of information processing by increasing self-efficacy [18]. Self-efficacy refers to an individual's judgment of his or her ability to complete a task. The improvement of self-efficacy is divided into several segments. The first is to gain sufficient enactive mastery experience, which refers to the prior experience that involves the successful use of specific skills. To improve

self-efficacy in this area, individuals can do so by becoming proficient in their preferred social media functions. For informational processing individuals, in addition to being familiar with the basic functions, it is particularly important to master the hashtag function. The hashtag function is useful for better navigation of the individual's goal-related information, which in the context of this paper is identity-related information. By browsing only tag topics, individuals are able to use external help to overcome some distractions [19]. Together with the increased self-efficacy that comes with mastery of the function, individuals can be relatively accurate and effective in their ability to process information even in the absence of working memory.

Another area where self-efficacy can be enhanced is vicarious experience, which involves observing the failures and successes of others and comparing them to one's own. This creates a referential comparison and builds role models. In social media activities, individuals can build a successful model by consuming the content posted by internet influencers on the one hand. On the other hand, the individual may also find some flaws of influencers to achieve a downward comparison. The third area is social persuasion. Social persuasion refers to the enhancement of self-efficacy through positive feedback from others [20]. To achieve this, individuals can post high-quality posts to gain recognition and encouragement from others.

For normative processing individuals, their access to information is accomplished primarily by automation or the interaction of long-term and working memory. But the formation of automation is highly demanding in terms of cognitive load, that is, it requires individuals to form rather systematic schemas, and the information processed needs to match the schema well [5]. The main task to improve the information processing capacity of normative processing individuals is to optimize cognitive load. Optimization of cognitive load is divided into finding schema matches and reducing the burden for working memory.

The main aspect of enhancing cognitive load of normative processing individuals is to enhance the germane cognitive load. Germane cognitive load is associated with processes that directly process content related to learning, such as schema building and automation. Research points out that giving individuals more choices of situations can help them establish schemas. That is, when there are many similar situations with various expressions, individuals have a higher chance of finding information associated with the schema that already exists. The relevant information can be processed directly by the schema, freeing up more working memory capacity to process the new information or discard the irrelevant information [21]. The implication of this research for the identity acquisition behavior of normative processing individuals on social media is that individuals can increase the likelihood that information can be matched to existing identity schemas by browsing a wide range of content or by joining more communities that are likely to be suitable for the structured identity perception.

In addition, reducing the burden of working memory can help normative processing individual's mindless acquisition of information. The burden can be reduced by balancing the visual and auditory working load. The input to working memory is primarily by both visual and auditory pathways, but the activity on social media is mainly done through vision. This has the potential to cause an overload of the visual route while working memory capacity reached its limit. It is possible to balance the visual information processing overload by increasing the auditory information input. For normative processing social media users, they can use more multimedia-based social media platforms such as TikTok and YouTube.

Regarding the diffuse-avoidant styled social media users, due to the lack of cognitive architecture connection to such identity construction, this paper will provide suggestions on how to receive more feedback from social media. That is, the suggestions will be based on the principles about making the audience better understand the content being posted. By allowing viewers to better understand what they are posting, diffuse avoidant individuals can harvest more comments that align with their values, thus solidifying identity construction.

The first method diffuse-avoidant individuals can use is posting multimedia content more. According to the multimedia principle, people learn better from both pictures and words compared with viewing words alone. Another suggestion is to post in a casual tone instead of formal language. As suggested by the personalization principle, audiences have a better perception and engagement of the content with conversational language. Although there are many subtitle-reading softwares to help bloggers read the subtitles along with the video, the voice principle suggests that people learn better from the human voice. Therefore, diffuse-avoidant individuals can try to read the subtitles themselves rather than using those softwares to read subtitles [22].

4. Conclusion

This paper discussed the identity search on social media and its underlying cognitive architecture foundation. The identity search is divided into three types based on the identity search model proposed by Berzonsky. They are informational processing style, normative processing style, and diffuse avoidant style respectively. The environment social media has provided to these identity search types is discussed. What's more, the function of working memory and long-term memory in those identity search behaviors is also elaborated.

The finding of this paper was that for the informational processing style, social media has created an informational environment for such identity construction. Working memory is highly involved in such identity construction. Its function is allocating attention and intentional problem-solving. In addition, having well-developed schemas can relieve the working memory burden. For the normative processing style of identity construction, social media provides community bonds to the individuals who adopt this type of identity construction. The automation and structured schemas contribute to the mindless manner of information processing of such styled individuals. As for the diffuse-avoidant individuals, social media can give them straightforward and immediate situational feedback. Although the cognitive architecture involvement in this type of identity construction is unclear, certain connections can be drawn from the cognitive pattern of media multi-taskers. That is, working memory failed to direct attention and confused schemas are unable to overcome the interference of irrelevant memory.

This paper filled the gap between cognitive architecture theories and the identity search on social media. As aforementioned, social media use prevails among the world population. And using information acquired from social media to construct identity can also be a concern. This paper shed light on the theoretical base of such concern since there is little research about identity search on social media and cognitive architecture. The paper also provided some insights into the individual users regarding the usage of social media. The suggested usages aim to optimize the identity-relevant information processing on social media.

The limitation of this study was the lack of experimentation. The findings and analysis of this research were largely composed of empirical research. Therefore, more well-designed experiments are needed to prove the theory suggested by this paper.

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