

Exploring the Impact of Cognitive Conflict, Meaning, and Motivation on Memory

Zenghe Yang *

Huaiyang high school Henan province, China

* Corresponding Author Email: 206081140@mail.sit.edu.cn

Abstract. Cognition and memory are two related but distinct psychological processes. Cognition refers to the process by which people acquire, process, and form memories from information, while memory is the process of storing and retrieving information. It should be noted that memory is not a static process, but a dynamic and complex one that can be influenced by various factors. Motivation, attention, and emotional state all play important roles in shaping people's memory processes. This study aims to explore the impact of these factors on cognition and memory, in order to improve people's understanding of the cognitive process and provide a theoretical basis for improving learning and memory efficiency. By applying the insights gained from the research, people can develop more effective education and training plans and enhance their learning abilities in daily life.

Keywords: Cognitive Conflict, Meaning, Motivation, Memory.

1. Introduction

Cognition and memory are fundamental processes that exert a profound influence on human learning and everyday life. These cognitive functions have been the subject of extensive research, prompting numerous inquiries into their intricate mechanisms. Questions have arisen concerning the extent to which external stimuli can drive cognitive development. Do the brain's innate assimilation and conformity mechanisms come into play when confronted with novel information, or are they activated as a result of cognitive conflicts? These queries underscore the intricate interplay between cognitive processes and external influences.

In light of these inquiries, the research endeavors to address these pivotal questions by devising a comprehensive set of experimental protocols. The aim is to empirically investigate the impact of distinct informational stimuli on the memory retention and cognitive capacities of the study participants. Through meticulously designed experiments, we intend to shed light on the change of cognitive development and memory formation when confronted with varying information stimuli.

The research design comprises two distinct groups of experiments, each tailored to scrutinize different facets of the cognitive process. By systematically manipulating the nature and content of the stimuli, we seek to disentangle the intricate web of factors influencing cognition and memory. This empirical approach allows us to examine whether cognitive development is predominantly driven by external forces, guided by the brain's inherent mechanisms of assimilation and conformity, or whether cognitive conflicts serve as catalysts for cognitive growth.

In summary, this research embarks on a journey to elucidate the multifaceted relationship between cognition, memory, and external stimuli. Through meticulous experimentation, this research aims to contribute valuable insights into the intricate dynamics that underlie human cognitive development and memory formation when confronted with diverse information stimuli. And findings hold the potential to advance the understanding of these cognitive processes, with implications to promote further research in this field.

2. Literature review

In the extensive body of literature related to cognition and memory, researchers have consistently emphasized the significant roles that motivation and meaning play in shaping these cognitive processes [1]. This multifaceted relationship between psychological constructs and cognitive

outcomes has garnered widespread attention within the field of cognitive psychology. Therefore, a deep exploration of these complex dynamics is crucial to enhance understanding of their nuanced interplay.

Motivation is regarded as one of the fundamental determinants of human learning and memory [2]. Roediger's seminal research in 1980 elucidated the concept of motivation, distinguishing between intrinsic and extrinsic motivations. Intrinsic motivation, characterized by curiosity and an innate thirst for knowledge, serves as a potent driving force behind individuals' efforts to acquire new information. It compels individuals to engage in the learning process, enhancing the encoding of knowledge into memory. Conversely, extrinsic motivation, typified by external rewards and punishments, exerts its influence by encouraging individuals to remember and subsequently recall information. The intricate interplay between these motivational facets forms the foundation upon which cognitive processes unfold.

Cognitive conflict, a phenomenon intricately linked to cognitive development, arises when new knowledge conflicts with preexisting cognitive schemas [2]. This cognitive dissonance stimulates individuals' inherent desire to resolve discrepancies, thereby fostering exploration and cognitive growth. The resolution of cognitive conflicts is posited to lead to the refinement and expansion of existing cognitive frameworks. Consequently, it serves as a catalyst for improved cognitive and memory outcomes. While the influence of cognitive conflict on cognition and memory has been acknowledged, the precise mechanisms and moderating variables remain subjects of ongoing investigation.

Meaning, a concept deeply rooted in the relevance of information to individuals' life experiences and backgrounds, has emerged as another salient factor shaping memory processes. Information imbued with personal relevance and significance is more likely to be encoded and retained in memory [2]. This underscores the intricate web of connections between an individual's self-concept and the meaningfulness of the information at hand. As such, the concept of meaning transcends mere memorization and delves into fundamental aspects of human cognition and identity.

However, it is crucial to note that while existing research has shed light on the individual contributions of motivation, cognitive conflict, and meaning to cognition and memory, the intricate interplay among these factors remains an area of active investigation. The existing body of knowledge has illuminated the significance of each factor in isolation, yet the synergistic effects and potential moderating variables that characterize their interaction have yet to be fully elucidated. Consequently, this study endeavors to bridge this gap by conducting a rigorous empirical examination, utilizing experimental methodologies to unravel the intricate dynamics at play.

Through systematic experimentation, the research aim to provide a comprehensive understanding of how motivation, cognitive conflict, and meaning interact to influence cognition and memory. By corroborating emerging cognitive and memory theories with empirical evidence, this research holds the promise of advancing comprehension of these fundamental cognitive processes, offering potential insights into educational practices, memory enhancement strategies, and the broader landscape of cognitive psychology. The subsequent sections will delineate the specific experimental designs and methodologies employed to investigate these intricate relationships.

3. Critique of 3 selected papers

3.1. Critique of paper1

This paper explored the effects of cognitive conflict on situational memory, a challenging area of research [3].

The experiment used an innovative approach to observe the effects of linguistic expressions on situational memory by modifying semantics to change the context of situational memory. In their experiment, they guided participants through different linguistic meanings to influence situational recall of a specific object (a cow) in two different scenarios (street and grassland).

First, the experimental results suggest that semantic inconsistency can lead to misleading information in situational memory. This finding emphasizes the important role of language in memory formation, especially when polysemous words are involved or when language expresses multiple layers of meaning. This echoes previous research suggesting that the semantic structure of language can trigger cognitive conflicts in memory processing, thereby affecting the accuracy and reliability of memory.

Notably, the experimental approach provides an effective way to quickly determine the extent to which cognitive conflict affects situational memory. This approach has the potential for a wide range of applications and can play a key role not only in the field of language research, but also in cognitive psychology and memory research. It provides an effective tool for researchers to explore in greater depth the relationship between memory and semantics, and how cognitive conflicts in memory can be managed.

However, it is also important to recognize that accurately measuring whether the effects of memory are solely from semantic guidance in participants' sensory recordings itself is challenging. Furthermore, it is difficult to distinguish whether participants' responses were influenced by semantic judgements or common sense intuitions. This suggests that the effect of influence through simple and direct guidance, such as verbal, cannot be accurately measured because memory formation and retrieval are influenced by a combination of factors.

In conclusion, the research conducted by Ortiz-Tudela et al. provides important insights for a deeper understanding of the complex relationship between language and situational memory [3]. Despite some measurement challenges, our experimental approach provides a promising avenue for investigating the effects of cognitive conflict on situational memory and provides a useful reference for future research and experimental design. Developments in this area of research will contribute to a more comprehensive understanding of the nature of human memory and language processing.

3.2. Critique of paper2

The central goal of this experiment was to systematically investigate the effects of ordered and unordered syllables on participants' memory [4]. By contrasting between ordered and unordered syllable sequences, the study aimed to gain a deeper understanding of the effects of these two conditions on attention allocation and memory depth.

By using syllables as independent experimental material and making precise comparisons across conditions, the study ensured the reliability of the results. The lack of additional information and meaning in the syllables themselves helped to maximize the effect of other factors on the results, thus maintaining the internal validity of the experiment.

When analyzing the results, it appeared that ordered syllables are more attractive relative to unordered syllables, which means that they occupy a more prominent position in participants' attention allocation. This finding is closely related to Attention Allocation Theory, stating that ordered and structured elements are more likely to attract an individual's attention. It also sheds significant light on deep processing theory, suggesting that information is more likely to be retained in long-term memory through deep processing and a more systematic approach to encoding. In this experiment, ordered syllables may have facilitated deeper memory storage by stimulating deeper cognitive processing.

It is important to note that the main focus of the experiment was the effect of differences between ordered and unordered syllables on memory. The experiment successfully demonstrated this core observation despite differences in musical levels. In order to understand this effect more fully, future research could consider conducting a broader experiment among participants with varying levels of musicality to further validate the generality of this phenomenon.

In summary, this experiment aimed to clarify the effects of ordered and unordered syllables on memory. By emphasizing this core objective in the experimental design and analysis, the study provides important insights into the field of cognitive psychology and provides strong experimental support for research on attention allocation and memory depth. Future research in this area could

further expand our understanding of memory processes under different conditions and contribute to the development of cognitive psychology.

3.3. Critique of paper3

This comprehensive analytical paper delves deep into various authoritative studies within the field of cognitive psychology [5]. It encompasses Sigmund Freud's (1938) exploration of psychological conflicts between the ego and the id, Kurt Lewin's (1935) research on motivational conflicts, such as approach-avoidance conflicts, Festinger's (1957) theory of cognitive dissonance, Kurt Lewin's (1935) research on motivational conflicts, such as approach-avoidance conflicts, Festinger's (1957) theory of cognitive dissonance, Clark Hull's (1943) conflict drive theory, which examines impulses related to inhibition and action, and Neil Miller's (1959) investigation into competitive tendencies [5]. This paper not only integrates these abstract theoretical research findings with real-world manifestations of cognitive conflict but also analyzes the relationship between cognitive conflict and adaptive behavior through database analysis. This comprehensive research approach provides us with a deeper understanding of the mechanisms of cognitive conflict and its practical applications in real-life situations.

One noteworthy aspect is the effective balance achieved in this paper between theoretical analysis and practical application. Through the comprehensive analysis of authoritative research, it not only explores the concepts and theoretical foundations of cognitive conflict but also applies these theories to real-world contexts. This holistic approach aids in clarifying the linkages between theoretical viewpoints and practical experiences, offering valuable insights for further research in the field of cognitive psychology.

However, despite its many strengths, this paper also has some potential limitations. Firstly, it has been criticized for utilizing some outdated theories and data for analysis. As the field of cognitive psychology continues to evolve, new theories and research methods continually emerge, and this paper may not have fully taken into account the most recent research findings. Consequently, it may lack currency in terms of the latest developments.

Another limitation is that, while this paper extensively explores cognitive conflict, it may not have sufficiently considered individual differences among diverse cultural, age, and background groups. Cognitive conflict may manifest differently in various populations, and more caution and consideration are needed when applying research findings to different demographics.

In conclusion, this comprehensive analytical paper provides profound insights into cognitive conflict and seamlessly integrates theoretical research with practical application. While there are limitations concerning currency and individual differences, this paper offers essential theoretical and practical references for the field of cognitive psychology, sparking valuable considerations for future research directions. By incorporating the latest research and recognizing individual variations, people can further expand the understanding of cognitive conflict.

4. Questions and hypotheses

Building upon the wealth of research in the field of cognitive schema and episodic memory, it becomes evident that alterations in memory significantly impact changes in cognition. However, the inquiry extends beyond the established literature to delve into the nuanced aspects of whether the specific meaning associated with different cognitive conflicts and memories exerts an influence on both memory and cognition. This research aims to explore whether cognitive conflicts imbued with varying meanings lead to differing degrees of change in memory bias and cognition. This inquiry is motivated by the recognition that not all cognitive conflicts are created equal; their meaning and relevance may play a pivotal role in shaping cognitive outcomes.

As research scrutinized the existing body of literature, a hypothesis emerged from analysis: orderly and logically structured information may be more likely to induce cognitive conflict compared to disordered information, consequently exerting a more pronounced influence on cognition and

memory. This hypothesis is rooted in the notion that information presented in an orderly and coherent manner may challenge preexisting cognitive structures to a greater extent, thereby stimulating cognitive conflict and potentially leading to more profound alterations in memory and cognition.

To contextualize this hypothesis, it is essential to consider the potential cognitive processes at play. When individuals encounter information that is presented in an organized and logical manner, they may experience cognitive dissonance as their preexisting schemas are disrupted. This disruption, in turn, may prompt individuals to engage in more comprehensive cognitive processing, as they grapple with reconciling the new information with their existing knowledge frameworks. In contrast, when presented with disordered or incoherent information, individuals may not experience the same level of cognitive conflict, as the information may be dismissed or assimilated more easily into existing schemas.

Our hypothesis posits that the presence of cognitive conflict, particularly when induced by orderly information, could lead to more profound changes in memory bias and cognition. In essence, we seek to explore the potential variability in the cognitive impact of cognitive conflicts based on the meaningfulness and organization of the conflicting information.

In conclusion, the investigation seeks to shed light on the intricate interplay between cognitive conflicts, their associated meanings, and their effects on memory and cognition. By delving into the potential nuances of cognitive conflict, this paper aims to enhance the understanding of the cognitive processes that underlie memory and cognition alterations. Furthermore, the exploration of the hypothesis regarding the influence of orderly versus disordered information adds depth to the study of cognitive conflict and its consequences. The subsequent sections of this paper will detail our experimental design, methods, and data analysis procedures, aiming to provide empirical insights into the intriguing questions posed in this discussion.

5. Proposed Methods

5.1. Participants:

Using a questionnaire survey, we will select 600 people who have a certain understanding of astronomical knowledge and are eager to learn, evenly distributed across various demographics.

Then they will participate in two groups of experiments, the first group will use textual information as the main material, and the second group will use pictorial information as the main material.

5.2. Experimental design:

Participants are divided into three groups, A, B, C, and other conditions are distributed evenly, as shown in Figure 1 and Figure 2.

5.2.1. Experiment1

Prepare T1, T2 two groups of information, T1 contains a wealth of knowledge about astronomy, T2 has nothing to do with astronomy

The first experiment, Group A learns T1, Group B learns T2, Group C learns T2 and sets the goal.

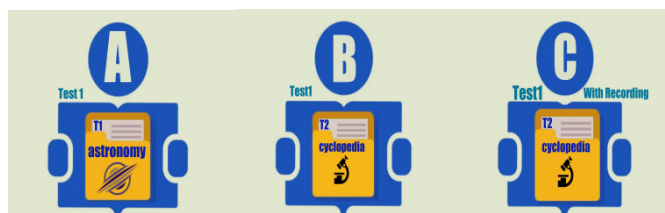


Figure 1. Details of the first experiment.

5.2.2. Experiment2

Prepare P1, P2, P3 three groups of picture information, Group A has obvious real meaning and close to life, Group B has obvious real meaning but contradictory to life experience, Group C does not have obvious real meaning and contradictory to life experience.

The second experiment, Group A observes P1, Group B observes P2, and Group C observes P3

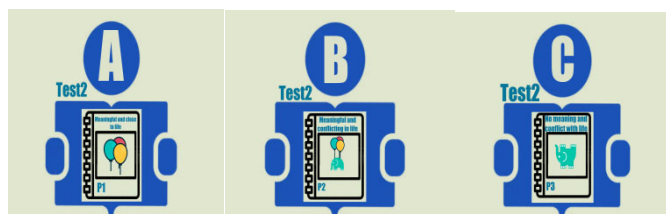


Figure 2. Details of the second experiment.

Table 1. Picture information and participants.

Group	Picture	Content1	Content2
A	P1	meaningful	Close to life
B	P2	meaningful	Conflict to life
C	P3	pointless	Conflict to life

Table 1 shows three groups of subjects along with their respective image material content and comparison relationships.

5.3. Experimental test:

Detecting and counting their learning cognitive situation, Testing and counting their cognition of picture information memory, and counting again after an appropriate interval of time.

5.4. Data analysis:

Statistical analysis was conducted on the collected data to assess the effects of motivation, cognitive conflict, and meaning on cognition and memory. Data from different experimental conditions were analyzed to compare subjects' performance in cognitive and memory tasks. Through statistical tests, the association between motivation, cognitive conflict, and meaning and cognition and memory was explored.

6. Expected Results

Based on existing research and theories, we expect that motivation, cognitive conflict and meaning have significant effects on cognition and memory.

In the first set of experiments, group A learns T1, group B learns T2, and group C also learns T2, but in the case of group C, we will set a certain goal for him to learn as an external motivation. Group A mainly relies on internal motivation. Group B is the control group. Comparing group A with group B we can get the effect of internal motivation on cognition and memory, and comparing group B with group C we can get the effect of external motivation, and the relationship between group A and C can be derived from both of them. The relationship between the two of them can be obtained. According to the research and literature of previous scholars, it can be obtained that in most of the cases, the effect of internal motivation on memory is greater than that of external motivation [6]. Moreover, external factors can be counterproductive if they are too strong, and in the right amount, external motivation can be used as a factor to motivate subjects and improve their cognitive level. And we will also find that internal and external motivation will have different effects in different text difficulty, when the text information is too complex, the situation of the subjects tends to be that internal motivation is mainly greater than external motivation group.

In the first paper, he studied the cognitive conflict, the effect on the episodic memory, and he observed the language by modifying the language to express the impression on the episodic memory [3]. In the same way, we follow this research method as a theoretical structure designed to the above by changing the picture information to observe the effect of this conflict approach on memory. Group A and Group B are the comparison between cognitive conflict and life experience, and Group B and Group C are the comparison between the meanings of things themselves on memory. Based on Piaget's structure of cognitive abilities, it is clear that in the comparison between Group A and Group B, we can see that when cognitive conflicts arise, Group A tends to have deeper memories, while Group B's memories are more ambiguous[7]. In the comparison between group B and group C, we will find that the meaning of the thing itself will raise the level of people's cognition of this thing, and the more relevant it is to the subject's own life, the corresponding cognition, the higher the elevation. When we put the comparison data charts of group A and group B and the comparison data charts of group B and group C together, we can find that the degree of relevant memory is in the form of group B is larger than group A is larger than group C. This shows that cognitive conflict is more significant in improving the cognitive level than the thing itself. Overall, this research found that participants remembered the material best when it had strong motivational meaning and a high degree of cognitive conflict. However, when the motivational meaning was weak or the level of cognitive conflict was low, participants remembered relatively poorly.

7. Discussion

The results of this study reveal the complex relationship between motivation, cognitive conflict, and their respective effects on cognitive and memory performance. As we have discussed, intrinsic motivation, characterized by genuine curiosity and an intrinsic desire for knowledge, is a powerful driver of cognitive and memory enhancement. This is consistent with previous research emphasizing the positive impact of intrinsic motivation on learning and memory [6]. Subjects who were innately motivated to acquire new knowledge demonstrated higher cognitive processing, resulting in improved memory retention and recall. This emphasizes the critical role of genuine interest in driving effective learning and memory outcomes.

Furthermore, our exploration of extrinsic motivation suggests that when it can have a positive impact on cognition and memory, its influence appears to be relatively weak compared to intrinsic motivation. This finding suggests that intrinsic motivation tends to produce stronger and longer-lasting cognitive benefits. While external rewards and punishments that can motivate individuals to remember and recall information, intrinsic drives stemming from intrinsic motivation appear to lead to deeper cognitive engagement, resulting in superior cognitive and memory performance.

In our reading of the design of the related scholars' experiment, this experiment had difficulty in distinguishing whether participants' responses were influenced by semantic judgement or common sense intuition [3]. This suggests that the effect of influence through simple and direct guidance such as verbal cannot be accurately measured because memory formation and retrieval are affected by a combination of factors. To avoid this problem, our improved analogue experiment ensured that the test content was of a certain level of difficulty and relatively detached from obvious influences such as common sense. This was achieved by designing more complex and abstract situations to ensure that participants' memories were more directly and significantly influenced by information guidance.

Based on Ebbinghaus's study on the effect of this ordered and unordered syllables on memory, we choose to expand the scope of our study from ordered and unordered syllables to things themselves with or without meaning, to gain a deeper understanding of the effect of these two conditions on the allocation of attention and depth of memory[4].

According to Piaget's literature, for example when children feel experiences that conflict with their own foresight they are driven to reconstruct their own support this situation is called upsetting the equilibrium, or disequilibrium [7]. That is to say that they think of themselves in a way that is inconsistent with reality, and this is when the mechanisms of assimilation and conformity kick in to

promote cognitive development. The findings clearly show that when individuals encounter new knowledge that conflicts with their existing cognitive schema, their innate desire to explore and resolve cognitive conflicts acts as a catalyst for improved cognitive and memory performance. This is consistent with the accepted view that cognitive conflict, when managed constructively, can facilitate cognitive growth and improve existing cognitive frameworks.

The implications of these findings extend far beyond the scope of our experimental setting. A deeper understanding of the processes underlying cognition and memory provides some insights into the broader field of learning and memory. These insights have the potential to inform educational practice, memory enhancement strategies and optimization of learning outcomes. By utilizing intrinsic motivation and strategically engaging in cognitive conflict, individuals can unlock their cognitive potential and enhance their overall learning and memory experience.

In practice, the theoretical foundation established in this study has the potential to provide tangible benefits to individuals seeking to improve their learning and memory retention effectiveness. By fostering and utilizing intrinsic motivation, educators and learners can create an environment conducive to improved learning outcomes. Furthermore, recognizing the role of cognitive conflict in stimulating cognitive exploration provides practical guidance for learners and educators. Encouraging positive resolution of cognitive conflict can serve as a powerful tool for cognitive development, ultimately leading to improved learning and memory.

8. Conclusion

In summary, the findings of this study contribute to our understanding of the intricate interplay between motivation, cognitive conflict, and cognitive and memory performance. Intrinsic motivation is a powerful driver of cognitive and memory enhancement, whereas the influence of extrinsic motivation is relatively weak. Furthermore, constructive resolution of cognitive conflicts stimulated subjects' cognitive exploration, leading to improved cognitive and memory performance. The theoretical underpinnings and practical implications of this study offer hope for improving learning outcomes and enriching individuals' quality of life through more effective learning memory strategies. Further research in this area is expected to yield additional insights and refine our understanding of these fundamental cognitive processes.

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