The role of consciousness in memorization: Asymmetric functioning of consciousness in memory encoding and decoding

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Abstract

One can see each individual's daily life as a sequence of events, each of which should be associated with his/her conscious and deliberate activities of decision-making, and unconscious and automatic activities of action selection. In continuation of the discussion we provided in [5] concerning event memory creation and utilization on the basis of the architecture model the authors have developed for simulating human beings' in situ action selection, Model Human Processor with Realtime Constraints (MHP/RT), this paper provides a deeper understanding of the role of consciousness in memorization, or memory encoding, based on MHP/RT, with the supporting empirical evidence consistent with the following prediction. MHP/RT assumes that decision-making and action selection should be controlled by Two Minds in general, and Four-Processes in detail. Four-Processes distinguishes the functioning of System 1 and 2 before and after an event. Four-Processes predicts that deliberate reflection of the past event using System 2 would create a memory encoding of the event that would be recallable in the future; on the other hand when the event is processed solely by System 1, it would create a memory encoding that is not consciously recallable via System 2 in the future. This paper provides evidence of the asymmetric functioning of consciousness in memory encoding and decoding that is consistent with this prediction from an experiment at a movie theater where the participants encoded the movies into their memories as they usually would do, and asked to decode them afterwords.

Keywords: Two Minds, memory decoding, memory encoding, Model Human Processor with Real Time Constraints (MHP/RT)

1 Introduction

Human beings' daily activities can be viewed as a sequence of decision making and action selection. Decision making is a time-consuming effortful deliberate activity carried out by

System 2 of Two Minds. On the other hand, action selection is an automatic effortless activity carried out by System 1 of Two Minds. Although they work quasi-independent, they are mutually connected by sharing memory structures created by external stimuli.

The memory system encodes activities of the nervous system to internal and external stimuli, carried out by System 1 and/or System 2. At the same time, every time when a pattern of stimuli is input to the memory system, which could be internal or external, it is decoded by selectively activating the relevant part of the memory structure. Decision making is controlled by *consciously* encoded memory and *conscious* decoding of memory. On the other hand, action selection is controlled by *unconsciously* encoded memory and *unconscious* decoding of memory. The detailed connections in the memory structure should be significantly different from person to person due to the differences in the detail of memory encoding processes, which should cause differences in behavior, that reflects how the encoded memory is decoded, even when the *same* stimuli were input.

The goal of this paper is to provide a deeper understanding of the role of consciousness in memorization, or memory encoding, based on the architecture model, MHP/RT (Model Human Processor with Realtime Constraints), which is capable of simulating our daily decision making and action selection [5], with the supporting empirical evidence consistent with the following prediction. MHP/RT assumes that our daily life should be regarded as a sequence of events, and each event be associated with decision making and action selection, which should be controlled by Two Minds in general, and Four-Processes in detail. Four-Processes distinguishes the functioning of System 1 and 2 before and after an event [5]. Four-Processes predicts the following: Deliberate reflection of the past event using System 2 would create a memory encoding of the event that would be recallable when performing deliberate planning in preparation for a *similar* future event by decoding its representation. When the past event is processed solely by System 1, it would create a memory encoding that is not consciously recallable via System 2 in preparation for a future event that is similar to the past event. This predicts that even if two persons created similar memory encodings as the result of System 1's activity towards the same event, there would be significant differences in decoding of the event memory if one encoded it jointly with System 2's activity and the other did not. The former will be able to recall the event consciously, triggered by, for example, some verbal description of the event. In contrast, the latter will not be able to recall the event with conscious cues but only with unconscious ones such as the physiological states associated with the event.

This paper starts by briefly describing MHP/RT, followed by its operation focusing on the above-mentioned four processing modes and how they are related with forming memory, or encoding, and using memory, or decoding. In addition, this paper provides evidence of the asymmetric functioning of consciousness in memory encoding and decoding that is consistent with the prediction from an experiment at a movie theater where the participants encoded the movies into their memories as they usually would do, and asked to decode them afterwords.

2 Memory encoding and decoding in MHP/RT's Four-Processes

2.1 Outline of MHP/RT

MHP/RT is an architecture model that is capable of simulating our behavior selection processes [5, 4]. MHP/RT includes a mechanism for synchronizing autonomous systems, depicted as round rectangles in Figure 1, working in the "Synchronous Band." MHP/RT was created by combining two seminal works in different fields that deal with human behavior. The first work is