

# Memory Manipulation and Personal Identity

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Memory erasure might be the ultimate human desire. Propranolol seems to make it come true. Memory manipulation or memory erasure causes ethical problems, however. The basic ethical problem about memory manipulation is the criterion for numerical personal identity. Fortunately, using propranolol does not disrupt numerical personal identity, because propranolol does not threaten psychological continuity and it only dampens a link between memory and emotion. But new technologies like U0126, ZIP and the elevation of transgenic  $\alpha$ CaMKII can threaten personal identity, although they might save PTSD patients in the future. From an ethical point of view, we need to pay attention to such new technologies more carefully to keep personal identity.

## Conclusion

## Introduction: Social contexts

### PTSD has come to be recognized as a social problem in Japan

Post-traumatic stress disorder (PTSD) caused by the Great Hanshin Earthquake (1995) drew the attention of Japanese mass media. PTSD has come to be recognized as a social problem. Facing these social circumstances, the Japanese Society for Traumatic Stress Studies (JSTSS) was established in 2002.

### Memory erasure might be the ultimate human desire

If seeking happiness is a common dream of all human beings and living with painful memories is unhappy, then erasing bad memories is a human desire. Memory erasure might be a technology in the future as enhancing memory by using methylphenidate like Ritalin is. So, memory erasure can be treated as one of the problems of human enhancement.

### Mass media are hypersensitive to memory erasure

In 2007, the Telegraph (<http://www.telegraph.co.uk/>) which is a British online news site introduced propranolol (a non-selective beta blocker) under the title of "Scientists find drug to banish bad memories".

## Current researches

### Propranolol dampens emotional parts of memories

Propranolol dampens a link between memory and emotion associated with a traumatic event. By using propranolol, the long-term potentiation (LTP) in the amygdala is blocked [1]. Then the emotional part of the memory is erased, although the cognitive part of the memory remains intact. Propranolol is effective not only when it is used during or shortly after a traumatic event, but also after the reactivation of the memory of a past traumatic event [2].

### Using propranolol caused ethical problems

The problems of using propranolol and memory erasure were examined in the President's Council on Bioethics (2003) [3]. The Council (2003) sounded the alarm about memory erasure from the viewpoint of human well-being. Kolber (2006) [4] examined the Council's proposal in detail. As a target article of AJOB, Henry et al. (2007) [5] criticized the Council (2003) for overblowing the effects of propranolol. According to Henry et al. (2007), overblowing the effects of propranolol violates human rights of using propranolol appropriately [5]. Levy (2007) also mentioned the ethical or philosophical problems caused by using propranolol [6].

### Four ethical problems are caused by using propranolol

The ethical concerns for using propranolol and memory erasure are categorized into four types: (1) authenticity, (2) a social demand for memory conservation, (3) autonomy and social justice, and (4) personal identity.

#### (1) Authenticity

Happiness ought to be pursued in terms of well-being. Living with painful memories and learning lessons from these painful memories are parts of the well-being. If so, memory erasure by using propranolol is morally problematic [3][7]. From the viewpoint of moral ability, it is possible that propranolol threatens to permanently cut off access to the emotions experienced at the time of trauma and this induces depression of moral ability [8][9]. Then, it has been noted that using propranolol might violate post-traumatic growth (PTG) [10].

#### (2) A social demand for memory conservation

Historical facts which depend on individual memories have a universal value common to all humankind, and we are responsible for conserving our memories even if they are uncomfortable [3]. Levy (2007) noted that erasing a memory can harm someone who shares it. If so, then memory erasure is not permissible in terms of the harm principle [6].

#### (3) Autonomy and social justice

The Council (2003) noted that we cannot be blind to the potentially immoral uses—by other individuals and/or the state—of biotechnological interventions that alter how we remember and what we forget [3]. Because of overmedicalization, our memories might fall victim to acquisitive medicine [5]. In these cases, informed consent becomes important [5]. In this context, Kolber (2006) argued that we have "rights to dampen memories" as well as "rights to enhance memories or memory-retention skills" [4].

#### (4) Personal identity

Erasing a memory or using propranolol can threaten personal identity [3][6].

## Personal identity and memory erasure

### It is important to distinguish between the criterion for numerical personal identity and a feeling of unified self

From an ethical point of view, the problem of personal identity caused by memory erasure will be important. But, discussions about the personal identity crisis are sometimes confused, because two aspects of personal identity—the criterion for numerical personal identity and a feeling of unified self—are put on the same table. The two aspects of personal identity should be examined separately.

### Rapidly altering a memory disrupts a feeling of unified self

Using propranolol can threaten a feeling of unified self and authenticity of our lives. In this case, it is important whether memory is altered rapidly or slowly. Rapidly altering a memory disrupts a feeling of unified self which is an aspect of personal identity. But the disrupted or altered personal identity is qualitative, not numerical.

### The criterion for numerical personal identity is the ethically minimum claim

A feeling of unified self or qualitative personal identity is premised on the criterion for numerical personal identity. So, the criterion for numerical personal identity sets a limit on memory manipulation.

### Psychological continuity is the weakest criterion

If psychological continuity or memory continuity between A point of time and B point of time is lost, then the numerical personal identity between A and B is no longer kept [11].

### Using propranolol does not threaten psychological continuity

Using propranolol does not erase a memory but dampens a link between memory and emotion. It affects only an emotional aspect of memory. So, it does not threaten psychological continuity and numerical personal identity.

## New technologies

### U0126 attacks fear engrams

U0126 (MEK1/2 inhibitor), which is known to cause amnesia, dissolves rats' fear conditioning by affecting the amygdala. It is thought that the U0126 deletes fearful memory rather than simply breaks the link between the memory and a fearful response [12][13][14].

### ZIP inhibits PKM $\zeta$ and vanishes long-term memories

In an experiment using rats, a drug called ZIP blocks PKM $\zeta$  which is an enzyme and is thought to be required for maintaining long-term memories [15]. The experiment reveals the mechanism of storing long-term memories. ZIP might be able to erase our painful memories.

### Selective erasure of memories of mouse brain via transgenic $\alpha$ CaMKII

It is shown that the elevation of transgenic  $\alpha$ CaMKII activity at the time of memory recall can cause rapid erasure of memory being retrieved. New and old fear memories can be rapidly and specifically erased while leaving other memories intact in the brain [16].

### These technologies can threaten personal identity and save PTSD patients

These technologies use mice, so concerns about personal identity and expectations for saving PTSD patients are not yet realistic. But from an ethical point of view, we need to pay attention to such new technologies manipulating memories.

## References

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