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# Personal Identity and Memory Erasure

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**Abstract**
Memory erasure might be the ultimate human desire. Using propranolol (a non-selective beta blocker) which is prescribed to patients suffering from PTSD, Post Traumatic Stress Disorder, seems to allow this desire to become reality. However, memory manipulation or memory erasure causes ethical questions. One of the serious questions is the criterion for numerical personal identity. Fortunately, using propranolol does not disrupt numerical personal identity, because propranolol does not threaten psychological continuity, and only dampens the link between memory and emotion. On the other hand, new technologies, like U0126, ZIP and the elevation of transgenic αCaMKII *can* threaten personal identity, although they might also be able to help PTSD patients in the future. From an ethical point of view, we need to pay attention to such new technologies more carefully in order to see whether or not they threaten personal identity.

## 0 Introduction: Social Contexts

The Great Hanshin Earthquake, which took place in 1995, resulted in many cases of PTSD, which drew the attention of the 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.

If seeking happiness is a common dream of all human beings, and if living with painful memories causes *un*happiness, then erasing painful memories seems to be an obvious human desire. Memory erasure might be technologically possible in the future, just as today memory enhancement is possible by using methylphenidate based drugs, such as Ritalin. So memory erasure can be treated as one of the problems of human enhancement. Actually in 2007 the British Telegraph news website (http://www.telegraph.co.uk/) introduced propranolol, a non-selective beta blocker, under the title of "Scientists find drug to banish bad memories".

In this paper, I will examine ethical problems caused by using propranolol and by memory erasing technologies from the viewpoint of the personal identity. First, I summarize current researches about ethical problems caused by using propranolol (1). Then, I examine the problems

from the viewpoint of the personal identity (2). Finally, I will discuss some new memory erasing technologies (3).

## 1 Current Research

### 1. 1 Propranolol dampens emotional parts of memories

Propranolol dampens the link between memory and emotion associated with a traumatic event. By using propranolol, the long-term potentiation (LTP) in the amygdala is blocked [1]. Because the amygdala regulates emotions, the emotional aspect of the memory is weakened by using propranolol, although the cognitive aspect 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]. Because of these effects, propranolol is regarded as a memory erasing drug.

### 1. 2 Using propranolol caused ethical problems

The problems of using propranolol and of memory erasure were examined in the American President's Council on Bioethics in 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. In a target article in *AJOB* (*American Journal of Bioethics*), Henry et al. (2007) [5] criticized the Council (2003) for overblowing the effects of propranolol. According to Henry et al. (2007), such an attitude violates people's right to use propranolol appropriately [5]. Levy (2007) also discussed the ethical or philosophical problems caused by using propranolol [6]. Like Henry et al., Levy also criticized the tendency to overblow the effects of propranolol. But at the same time, he examined and warned against memory erasure from the viewpoint of his extended mind hypothesis [6].[1]

### 1. 3 Four ethical problems

The ethical concerns about the use of propranolol and memory erasure can be categorized into four types: authenticity, a social demand for memory conservation, autonomy and social justice, and personal identity.

The first concern is authenticity. Happiness ought to be pursued in terms of well-being. Living with painful memories and learning lessons from these painful memories are part of our well-being. If so, memory erasure through the use of propranolol is morally problematic [3][7]. From the viewpoint of moral abilities, it is possible that propranolol threatens to permanently cut off access to the emotions experienced at the time of trauma, and this reduces moral abilities [6][8][9]. It has also been noted that using propranolol might violate post-traumatic growth (PTG). This is the capacity to deal with psychological difficulties in the future, which is obtained in the process of overcoming a traumatic event [10].

The second concern is a social demand for memory conservation. Historical facts which

1 I briefly explain Levy's extended mind hypothesis in the section 1.3.

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 another person who shares it [6].[2]

The third concern is autonomy and social justice. The Presidential 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]. Kolber stressed respect for people's autonomy.

The fourth concern is personal identity. Erasing a memory or using propranolol can threaten personal identity [3][6]. If the psychological theory of personal identity is right,[3] the continuity of memory is important for personal identity. I would now like to examine this fourth ethical concern in more detail.

## 2 Personal identity and memory erasure

### 2. 1 Qualitative identity and numerical identity

From an ethical point of view, the problem of personal identity caused by memory erasure is important. However, the discussion of this issue is often confused, because two aspects of personal identity are discussed at once: the criterion for numerical personal identity and a feeling of unified self. I would like to argue that it is important to distinguish between these two aspects.

I believe that the main cause of this confused situation is the ambiguity of the term personal identity. Because of this ambiguity, it is unclear what kinds of memory manipulation technologies are saddled with serious ethical problems.

Generally speaking, there are two kinds of identity: qualitative identity and numerical identity. If two things are qualitatively identical, they share the same properties. If something persists throughout a period of time, it keeps its numerical identity. For example, two oranges are two different things, but they share the same properties. In that sense, we can say that these two things are the same, namely in the sense that they are both oranges. The two oranges are not numerically identical but qualitatively identical. We can apply this categorization to the concept of personal identity as well. My present character is different from my ten-year-old character. However, both belong to my identical life, which is why I have numerical identity.

2 According to Levy's extended mind hypothesis, the mind is not confined within the brain and body but spills out into the world. If the hypothesis is right, someone's mental state depends on others' mental states. Or at least we can say that someone's mental state can be influenced by others' mental states. If so, memory erasure is not permissible in terms of the harm principle, which prohibits harming others as a minimum ethical demand. [6].

3 The conflicting viewpoint of the psychological theory of personal identity is the physical theory of personal identity. I will examine the debate between the psychological theory and the physical theory in another paper.

### 2. 2 The minimum ethical demand

Under normal conditions, it might seem that a personal qualitative identity changes through time, namely throughout a person's life, but it is rare that one's personal *numerical* identity is unbalanced. As a practical matter, our lives are constructed on the basis of personal numerical identities.

Based on what we said so far, I believe that we can fix a minimum ethical criterion by which to reach an agreement regarding what is *un*acceptable memory manipulation. I think that this criterion should be the maintaining of personal numerical identity. If a memory manipulation technique threatens personal numerical identity, then it should be regulated from an ethical viewpoint.

### 2. 3 Qualitative identity and psychological continuity

Using propranolol can threaten our feeling of unified self and the authenticity of our lives. In this case, it might be important whether the memory is altered rapidly or slowly. Rapidly altering a memory disrupts the feeling of unified self. However, the disrupted or altered identity is the person's qualitative and not their numerical identity.

My present character is indeed different from my ten-year-old character. But the pace in which our characters transform is slow. We can form relatively stable and unified self images even though we slowly change through time. In that sense, our qualitative identities are always changing, and yet we keep our numerical identities intact. On the other hand, rapid or radical changes of memories might cause a disruption of our unified self image. For example, if you wake up one day and suddenly realize that you are on the moon, then your life would probably radically change and your unified self image is obviously disrupted. However, even though you are puzzled and confused by this sudden change of qualitative identity, your numerical identity is not changed.

In order to maintain numerical personal identity it is important to keep memory continuities and psychological continuities. If such continuity between point A in time and point B in time is lost, the numerical personal identity between A and B is no longer kept [11]. In the moon scenario, your psychological continuity is probably kept despite the drastic change of your situation. In other words, your numerical personal identity is left intact. Thus, it is not necessarily the case that that radical changes of memories or qualitative identities and disruptions of the unified self image threaten numerical personal identity.

### 2. 4 Using propranolol does not threaten psychological continuity

Propranolol is sometimes introduced as a memory erasure drug. But using propranolol does not erase memories, it only dampens the link between the cognitive aspect and the emotional aspect of memories. It affects only the emotional aspect of memory, while the cognitive aspect remains intact. Therefore, based on what we said before, it does not threaten psychological continuity and numerical personal identity. As a result, using propranolol does not pose an ethical problem in the light of the numerical personal identity.

## 3 New technologies of memory erasure

### 3. 1 U0126 attacks fear engrams

The drug U0126, which is a MEK1/2 inhibitor, is known to cause amnesia. In experiments, it was found to dissolves rats' fear conditioning by affecting the amygdala. It is thought that U0126 deletes fearful memories, rather than simply break the link between such memories and a fearful response [12][13][14].

### 3. 2 ZIP inhibits PKMζ and vanishes long-term memories

Another memory erasing drug called ZIP blocks the enzyme PKMζ. According to experiments, this enzyme is thought to be required for maintaining long-term memories [15]. Therefore, some scientists speculate that ZIP might be able to erase painful memories.

### 3. 3 Selective erasure of memories of mouse brain via transgenic αCaMKII

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

### 3. 4 Implications of the new technologies

Unlike proplanolol, these technologies do not dampen the link between the cognitive aspect and the emotional aspect of memories. Rather, they seem to erase the traumatic memories themselves. However, it is uncertain whether the technologies can really erase bad memories or not, because these technologies are currently only tested on mice. So concerns about personal identity and expectations for assisting PTSD patients are not yet realistic. In the future, such technologies might be able to help PTSD patients. But on the other hand, they might also threaten their personal identity. Therefore, from an ethical point of view, we need to pay attention to such new memory-manipulating technologies.

## 4 Conclusion

Memory erasure might be the ultimate human desire. Using propranolol (a non-selective beta blocker) which is prescribed to patients suffering from PTSD seems to allow this desire to become reality. However, memory manipulation or memory erasure causes ethical questions. One of the serious questions is the criterion for numerical personal identity. Fortunately, using propranolol does not disrupt numerical personal identity, because propranolol does not threaten psychological continuity, and only dampens the link between memory and emotion. On the other hand, new technologies, like U0126, ZIP and the elevation of transgenic αCaMKII *can* threaten personal identity, although they might also be able to help PTSD patients in the future. From an ethical point of view, we need to pay attention to such new technologies more carefully in order to see whether or not they threaten personal identity.

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