Grief as a process of cognitive reorientation and disruption of prospective memory

Grief and Memory Theory through Neuropsychological & Humanistic Perspectives

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Grief is seen as an emotional reaction to a loss. Common complications associated with grief are longing for the deceased + sadness symptoms caused by the loss. In about 10-20%, persistent reactions occur which are generally referred to as complicated grief, and in the more severe chronic cases, known as prolonged grief, occur in 1-10% of cases.

Unexpected, sudden losses can have a profound impact on an individual's life and affect plans and expectations for the future. Therefore, grief interacts with future planning, predictive expectations and prospective memory, potentially influencing the grieving process. However, the role of updating prospective memories and plans in facilitating a successful grieving process is not fully understood.

Grief and bereavement are associated with the loss of something valuable, such as the death of a close relative, the loss of a significant other (public figure), the loss of a bodily function (sight, hearing, amputation) or the loss of a planned future scenario (property, environmental and climate issues). Even a mental image can trigger associations with a grief experience. Loss means an unrecoverable end to something that cannot be recreated in its original state.

Of course, all grief is difficult, but 90% of people have a varied and adaptive grieving process; who experiences complicated grief, and with what risk and vulnerability factors, is the subject of ongoing research. It is when the loss and grief reactions are persistently difficult over a long period of time, and when the person has obvious difficulties in returning to their previous everyday life, that one speaks of 'complicated' grief. Some people are more vulnerable for a variety of reasons and some losses and situations are more distressing than others, putting some at risk of developing complicated grief, which can often be associated with strong feelings of guilt, inadequacy, anger, bitterness, somatic symptoms or a shocking unexpected relief.

Much of the research that has been done on grief reactions comes from different clinical contexts, often psychiatric research, or humanistic research (pastoral care), or in other situations such as crisis and trauma situations. But it is important to know what normal grief is. The differences between normal grief and increasingly complex grief are not black and white, or qualitatively different, but grief and complex grief should be considered as two extremes along a continuum.

In grief, the memory of past experiences with the deceased may have a regulating function. In similar future situations, these memories can be used to predict and prepare for emotional reactions and thus contribute to the adjustment process. Autobiographical memories help to maintain a sense of continuity in life stories. In the case of a loss, the bereaved must reconstruct their life story to include the loss, which involves a complex interplay between remembering the past and anticipating the future without the deceased.

The predictive processing model emphasises the role of the brain in continuously updating its internal models of the world. In grief, this can mean that the reality of the loss is integrated into these models, affecting how future events are predicted and planned. Therefore, in the context of grief and loss, self-biographical memories are not just passive

recollections. They actively contribute to updating and reshaping future expectations and plans, illustrating a dynamic interplay between retrospective and prospective cognitive processes.

According to the Predictive Processing Framework model, the brain constantly updates predictions about the world based on past experiences. Autobiographical memories are in this context a rich source of data that the brain uses to make these predictions. During grief, an individual often returns to past experiences with the deceased. These autobiographical memories are not only retrospective; they influence the grieving person's expectations and predictions about the world without the deceased. The individual needs to adjust their mental models to cope with the loss, which is a prospective process.

The concept of the brain acting as a 'prediction machine' has been discussed philosophically since ancient times, exemplified by Plato in his cave parable, and in modern philosophy by David Hume, Immanuel Kant and empirically by Hermann von Helmholtz, but in more recent neurophilosophical contexts by thinkers such as Andy Clark, Anil Seth, David Chalmers and Karl Friston, who offer an intriguing perspective on the interplay between autobiographical and prospective memories, particularly in the context of grief.

In the predictive processing model, autobiographical (episodic) memories are used to update and refine future predictions. In grief, reliving memories of the deceased may lead to the realisation that future plans, expectations or beliefs need to be modified. The brain uses past experiences (autobiographical memory) to recalibrate and create new expectations for life (prospective memory) in the absence of the loved one.

One of the most well-known theories of grief is the often-cited FIFDA model by Elisabeth Kübler-Ross. She mentions five different stages in a grieving process: denial, anger, bargaining, depression and finally acceptance. Unintentionally, according to Kübler-Ross herself, the stages were never intended to follow a strict course and she later clarified that it seems that most of us rather jump back and forth between the stages and are on several levels at the same time. But surely that is where the explanatory value of the model ends? Nevertheless, stage models have become mandatory elements in a popular view of a 'normal' crisis and grieving process - in Sweden we have Johan Cullberg's well-known crisis model.

However, this pragmatic approach to analysing and understanding grief and loss has been widely criticised. Not least because the empirical evidence for such step models is rather thin. For example, George Bonanno and other researchers argue that recovery and resilience are much faster, more powerful and more unevenly distributed than previously thought. Bonanno's concept of 'coping ugly' is an eloquent expression of the fact that grief is highly individualised and is based on the experiences and relationships we happen to have with what has been lost. Why can't we experience relief when someone has died? Can an acquired disability mean that you can suddenly avoid excessive social demands and expectations? Is it allowed to laugh while grieving? And how long do you actually mourn? And with what intensity? Can grief pass in five minutes? Can you have a beer in the pub?

It has sometimes proved inappropriate to 'uncover' so-called denied frozen grief by forcibly repeating unpleasant and traumatic memories; or to carry out repetitions in organised debriefing; or that grief must be done in certain ways; or to 'live out' grief by crying in different variants of catharsis. Preconceived notions of how grief should be experienced may in some cases actually exacerbate feelings of guilt and shame. Loss of control can in some cases be unpleasantly frightening and often perceived as life-threatening. The need for social security and predictability is often urgently needed in such situations. Therapeutically, grief processing takes place in a well-organised manner and where updates of memories take place under a high degree of control and with a secure framework and structure.

There are large individual differences, which also shows that there are different neuroanatomical correlates and memories that co-vary

- not that there is only one 'correct' model for how grief can be handled. For example, George Bonanno reports that most of us have a high degree of 'resilience' that allows us to cope with major personal stresses without breaking down, and that most people are also back at work within days or weeks of a major loss. The problem with previous documentation is that it has been done by clinicians and psychotherapists who have mainly met people with complicated grief (10%) and therefore a confirmation bias has developed with preconceived ideas that have a priori and naively generalised this to apply to most of us, and sometimes with anecdotal psychoanalytic case studies discussed 'denial', 'withdrawal' and stage theories as if they were the truth of the day. Empirical research shows otherwise.

Another criticism is the view of authenticity or 'genuineness' of 'inner' feelings. Essentialism is rarely fully discussed by researchers, who often take a wait-and-see attitude, and thus become half-vitalist romantics. But are there any 'basic emotions' at all, such as sadness, joy, disgust, surprise, anger and fear, as Plato, Descartes and Darwin claimed and later as Paul Ekman, Tomkins, Adolphs, Solms, Panksepp, and others researched in the 20th century? Or do we just construct and cognitively update experiences through expectations and predictions that are then continuously revised and updated?

According to the latter view, as discussed in research by Joseph LeDoux and Lisa Feldman Barrett, we are not victims of a blindly inherited 'essential' inevitability, but rather we bear conscious responsibility for the direction of our higher cognitive experiences. This is in contrast to immediate avoidance reactions such as when we reflexively protect ourselves in the face of a sudden potentially life-threatening danger. The first is an executive function where we use our reasoning and conscious impulse-inhibiting control abilities to control our experiences but also to evaluate and update memories. The second is a non-conscious rapid survival response of only a few milliseconds - and thus within this short time frame does not reach any conscious emotional experience, the conscious interpretation and experience arises only secondarily.

Consciousness research is relatively new and today constitutes an increasingly comprehensive aspect of neuropsychological research on grief, challenging reductionist black-box thinking. And which also challenges the classical Frankfurt School's three-legged model of knowledge à la Jürgen Habermas to distinguish between natural science, human science and social science.

But what is the experience of loss? What is the 'true' experience of grief? Is grief and loss a fundamental primary emotion that emanates from one's 'deepest' and 'essential' psyche? Or is grief nothing more than multiple layers of memories, beliefs and broken expectations? Is this again a mirror of the old dualistic drama between body and soul?

If we mourn someone or something, it is in a personal relationship where memories also symbolise future planning, hopes and dreams - which also explains why we miss famous celebrities with whom we had no real personal relationship, but who are nevertheless part of our consciousness and our lives. At the same time, it means that we don't mourn the one we never thought about - like a complete stranger on the other side of the world.

Dealing with grief can be seen as cognitively constructing, reconstructing, deconstructing, reorienting, anticipating, creating a new meaningful lifeline after a loss. Creating new pre-expectations and new prospective memories - i.e. memories of what we think will happen, and plans that will fulfil this pre-expected future - and which from now on do not include the dead or what we have lost. In this way, grief can also become a social construct that can be exemplified by different turns in social contexts, not least at funerals, with a defined turn-taking how those present are ritualised to express their grief, e.g. where and how to sit, or who acknowledges whom. A person who is outside this inner circle, such as in the case of unauthorised love or hate, may or may not be able to express themselves in the same social community. This phenomenon

is well known in research and has been termed ‘disenfranchised grief’.

Rational explanatory models of grief can sometimes be perceived as having a kind of cold stoic logic and seeming frighteningly objectifying, but which nevertheless open up to new and varied individual-centred forms, with all their proximity, relational and reinforcement mechanisms, which are integrated into different memory modalities, neural networks and bio-feedback systems: short-term memories, perceptual memories, conditioning, semantic memories, epi-sodic memories, procedural memories and, not least, prospective memories.

The concept of ‘anticipatory grief’ sheds light on the phenomenon we face in situations where we know something will happen in the future, or where our hopes will not be fulfilled. We prepare for the upcoming inevitable last moment, and we update our dashed hopes during an ongoing life process. This is the case with disabilities such as loss of sight, hearing or limbs, or newborn babies with severe brain damage, cognitive impairments or with progressive diseases that last over time. Or a relative with a serious addiction who eventually breaches all social responsibilities. In anticipation of the inevitable, there is an endless array of updated daily griefs.

What is grievable?

The term ‘grievable’ refers to something that is worthy or deserving of grief or mourning. It is often used in discussions of loss and bereavement to highlight what is considered a legitimate reason to grieve. Judith Butler explores the concept in her work, particularly in her book ‘Frames of War: When Is Life Grievable?’ (2016). What is considered a legitimate reason to grieve can vary widely between cultures and societies. Some losses are universally recognised as grievable, such as the death of a loved one. Others, such as the loss of a job or the end of a relationship, may not always be recognised as grievable by everyone.

Different cultures have different norms and expectations about what constitutes a significant loss. These norms can influence how an individual's grief is perceived and supported.

For grief to be socially recognised, it often needs to be validated by others. If a loss is not socially recognised as grievable, the individual may feel isolated and unsupported in their grief process.

Judith Butler emphasises that certain lives are considered more grievable than others, reflecting wider social inequalities. For example, deaths in marginalised communities may not receive the same recognition and mourning as those in more privileged groups.

Grief and loss are associated with the loss of something valuable. Loss implies an irreversible end to something that cannot be recreated in its original state. In many cases it also includes personal loss of control and uncertainties:

- Death of a Loved One. This is the most recognised form of loss that triggers grief. The death can be of a family member, friend, or pet, or a significant other (public figure). Grief reactions can manifest as persistent rumination about the deceased, avoidance of reminders related to the death, and reliving memories or last moments.
- End of relationships. This includes divorce, breakup, or significant changes in personal relationships. Such losses can lead to grief reactions where individuals may ruminate over past events, avoid places or people associated with the former relationship, or relive memories and experiences shared with the person.
- Romantic attachment rejection (RAR) is a common and profound experience. Being rejected by a romantic partner or being in a one-sided unrequited love (chronically rejected), not only triggers intense emotional pain but can also have lasting negative effects on mental health.
- Failure or loss of attachment, including being ignored or experiencing subtle forms of neglect, can have significant impacts in social, professional, or personal contexts.

Being overlooked or bypassed, and not being acknowledged or unappreciated, can lead to increased stress, reduced work performance, and a sense of alienation. These experiences may lead individuals to compensate through self-destructive behaviours or vengeful actions.

- Loss of Health. A diagnosis of a chronic or terminal illness or a sudden decline in physical or mental health can lead to grief. Individuals may ruminate on their past health, avoid engaging in conversations or activities that remind them of their health before the illness, and repeatedly relive the moment of diagnosis or onset of symptoms.
- Loss of a bodily function (vision, hearing, amputation).
- Career or Financial Loss. Losses such as job termination, significant financial loss, or forced retirement can provoke a grief reaction. Affected individuals might ruminate on their previous financial stability or professional identity, avoid scenarios that remind them of their former job or financial status, and relive interactions or events that led to the loss.
- Loss of Identity or Autonomy. This can occur due to major life transitions such as aging, moving to a new place, or changes in life roles (e.g., becoming a caregiver). Individuals may experience grief as they ruminate over their former sense of self, avoid new roles or environments that highlight the change, and relive moments from when they felt more autonomous or self-assured.
- Loss of a planned future scenario (property, environmental and climate issues). Even a mental image can activate an association with a grief experience.
- Existential. Loss of meaning of life. Loss in faith and truth, disillusions.
- Environmental losses, nature loss and damaged eco-systems losses.
- Genocides as Holocaust, Gulag, Rwanda...

Different cortical regions are involved in all these states and characteristics. Changes in activity are observed by fMRI, hormone and metabolic issues, in the cingulate, insula, orbitofrontal and prefrontal cortices, areas associated with pain perception, distress and memory retrieval. Significant changes have also been observed in subcortical regions: the angular gyrus, hippocampus, striatum, nucleus accumbens, tegmental area, and temporal pole. These regions are associated with reward processing, dopaminergic circuits, emotion regulation and behavioural adaptation.

The contemporary empirical study of grief and bereavement has been profoundly shaped by Erich Lindemann's work in 1944. He noted that individuals in grief often become aloof in their social interactions, show heightened irritability, and anger, and tend to isolate themselves from social activities, despite others' efforts to sustain the relationship and provide support.

Individual responses to grief are diverse, but they can be broadly and empirically be grouped into several key categories, each reflecting a different aspect of the grieving process (Bonanno, 2004). Clinically common grief reactions could typically be categorised into several main groups:

- Behavioural autonomic involuntary reactions (fight, flight, freeze)
- Behavioural conscious actions as bodily actions, pacing, fidgeting or other agitated gestures, or slow lethargic movements.
- Physiological reactions, such as headaches, numbness, fatigue, nausea, restlessness, heart palpitations, pain, changes in appetite, sleep disturbances (insomnia) changes in sleep patterns, including difficulties falling asleep, staying asleep, or experiencing restorative sleep. Since sleep is crucial for memory consolidation, disruptions can impair prospective memory, affecting the bereaved's ability to remember and execute future tasks.
- Emotional reactions such as crying, sadness, irritability, anger, longing, yearning, guilt, depression, anxiety, and even relief. The emotional turmoil associated with grief can further complicate prospective memory. High levels of stress, anxiety, and depression, which are common in bereavement, can negatively affect cognitive processes, including memory encoding and retrieval.

- Cognitive reactions Grief consumes significant cognitive and attentional resources, leading to a state often described as 'grief fog.' This state can impair attentional capacity, making it more challenging to encode, retain, and recall intentions, especially in environments with many distractions or under conditions requiring working memory, attention, and focused attention (inability to concentrate) impulse inhibition, memory problems, learning difficulties, confusions, and persistent rumination, and even hallucinations or illusions.
- Social cultural ceremonials such as funerals, memorial services, and other cultural rites. Interpersonal interactions may be affected by grief, leading to feelings of detachment, strained relationships, or an increased reliance on social support networks. Grief can lead to social withdrawal and a decrease in activities that stimulate cognitive functioning, including those that engage prospective memory. This reduction in engagement can lead to a decline in cognitive abilities over time, further impacting the individual's prospective memory.
- Reasoning, spiritual, and philosophical reflexions, involves contemplating the meaning of life and death, spiritual beliefs, and philosophical thoughts about existence and the afterlife. Grief may lead to a re-evaluation of personal beliefs, a crisis of faith, or a deep search for meaning and purpose in life or in the nature of the loss.

Recognising these categories is crucial to understanding the complex nature of grief and underlines the need for comprehensive support that addresses the multiple dimensions of an individual's experience of loss. Paraphrasing Joseph LeDoux in his book The Four Realms of Existence (2023) we can hypothesise at least four levels of grief:

- **The Biological Realm**. This encompasses essential life processes common to all living beings, including metabolism, reproduction, and genetic transfer, highlighting the universality of biological functions.
- **The Neurobiological Realm**. Focusing on the nervous system, this realm explores the regulation of bodily functions and behaviours through neural networks, including rapid processes sometimes under 50 milliseconds.
- **The Cognitive Realm**. Covering mental processes like thinking, learning, memory, and problem-solving, this sphere investigates the internal mechanisms enabling information processing and knowledge formation.
- **The Conscious Realm**. Concentrating on consciousness and subjective experience, this sphere includes awareness of thoughts, feelings, memories, and experiences, and the creation of new conditions through prospective memories.

But in all living beings, these reactions are also based on the ability to make more or less good predictions about how to survive, mate and reproduce, avoid enemies, or get hurt, or get eaten. And how each biological system, down to the smallest amoeba, self-corrects when something goes wrong by calculating, at different levels and different modalities, via 'prediction errors' new more adaptive ways of functioning. This also includes the system's ability to update its memories to increase the probability of survival both phylogenetically and ontogenetically. It is simply about all the expectations, ideas and dreams we have, and what happens emotionally and cognitively when those expectations are not met according to our past learned experiences and personal needs.

Research by Joseph LeDoux and colleagues, among others, who have mapped avoidance into anxiety and fear reactions, shows that there is a wealth of empirical evidence that epi-sodic memories, when actualised, will often be updated and changed. In grief, it can therefore be concluded that when a memory is actualised, an adjustment of the memory ('updating') occurs when we perceive that the memorable association is no longer relevant but must be adapted to the difference in the actual new situation ('prediction error'). This can be compared to a neuronal plastic probability process processed by the brain, which also provides physiological feedback reactions via proprioceptive and interoceptive memory

structures between the central and peripheral nervous system - and where the phenomenological experience is simply ‘sadness’ when predictive expectations do not occur - even in milliseconds in a myriad of associations in lower modalities. Which also immediately triggers social bonding and caring behaviours, as part of an enhanced survival mechanism.

In addition, the outlines of various neuroanatomical correlates can be tentatively detected, and that many describe experiences of grief as oscillating with ups and downs of grief, in and out of reactions and associations, and that the frequency of this oscillation varies and gets used to and gradually decreases, perhaps as a result of Donald Hebb's old neural principle, while perhaps never completely disappearing but unexpectedly reappearing at an event or issue that at first glance may seem completely irrelevant, but still has a strong associative bearing; perhaps to a prospective memory that catches up and has not yet been updated...

Learning is a constantly repetitive process involving the frontal lobes, hippocampus, perceptual systems and motor areas of the cerebral cortex. For the hippocampus to be unloaded and ‘rebooted’, memories need to be stored in different modalities and neural networks and transmitted via associative areas such as the parietal lobes. These processes are optimised by sleep, during which a certain amount of memory consolidation seems to take place. Deep sleep (slow wave sleep) is particularly important. Danish researcher Maiken Nedergaard discovered what she called the ‘glymphatic system’, analogous to the lymphatic system, through deep sleep. The astrocytes are most effective during deep sleep and open up a permeability in the brain's blood vessel system that allows waste products to seep out and be transported away via the veins.

During deep sleep, memory consolidation also occurs; exactly how these two systems (i.e. deep sleep/memory consolidation) are related is not yet known, but the link between memory storage, deep sleep and stroke recovery seems quite clear. In the case of fatigue, rest and recovery have been shown to be important to consider, but the idea of ‘sleeping on it’ is good for memory storage, stress and general fatigue, but this may not always be true in the case of traumatic events or other unpleasantness. If one goes through something unpleasant, for some it may be better to stay awake for another 6 hours and instead do something completely different distracting so that the experience is not consolidated into new robust memory traces.

Updating memories has a direct psychotherapeutic component. Research shows that when memories are actualised, it takes a few minutes for memories to become in a state of change, in a ‘reconsolidation window’, which means an opportunity for molecular updating of memories for about 6 hours after the memory is actualised. In well-designed psychotherapies, new alternative memories can be implemented and update the previous perhaps dysfunctional experiences. The difficult art, of course, is to make this work in practice, but there are a number of different psychotherapeutic programmes that have adopted this approach. While others jokingly say that this is what all psychotherapy is about, and that skilled psychotherapists, when they succeed, are precisely memory reconsolidation they have been working on, even though they have not known the neuropsychology behind it.

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Some scientific and philosophical references in alphabetical order
(See relevant research articles or books by the respective authors)

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