Manuscript version: Author's Accepted Manuscript
The version presented in WRAP is the author's accepted manuscript and may differ from the published version or Version of Record.

Persistent WRAP URL:
http://wrap.warwick.ac.uk/129590

How to cite:
Please refer to published version for the most recent bibliographic citation information.
If a published version is known of, the repository item page linked to above, will contain details on accessing it.

Copyright and reuse:
The Warwick Research Archive Portal (WRAP) makes this work by researchers of the University of Warwick available open access under the following conditions.

Publisher's statement:
Please refer to the repository item page, publisher's statement section, for further information.

For more information, please contact the WRAP Team at: wrap@warwick.ac.uk.

Nonbelieved Memories in The False Memory Archive

Henry Otgaar[1,2,3], Charlotte Bücken[1], Glynis Bogaard[1], Kimberley A. Wade[4], A.R. Hopwood,

Alan Scoboria[5] & Mark L. Howe[3]

[1]Maastricht University, The Netherlands

[2]Faculty of Psychology, Universitas Indonesia

[3]City, University of London, UK

[4]University of Warwick, UK

[5]University of Windsor, Canada

In Press, Journal of Applied Research in Memory and Cognition

Correspondence should be sent to: Henry Otgaar, Henry.Otgaar@maastrichtuniversity.nl,

Faculty of Psychology and Neuroscience, section Forensic Psychology, Maastricht University.

Abstract

The False Memory Archive is a unique art collection containing hundreds of false memory reports submitted by members of the general population. The current study aimed to analyse these reports. Specifically, we examined whether some of the memories reported in these submissions were better described as nonbelieved memories (NBMs). Furthermore, we investigated the reasons for why people decided that their memory was false and assessed the verification strategies that people used to validate their mental representation. Five hundred submissions were coded and more than half (53.4%) met the criteria for NBMs. Social feedback was the most frequently reported reason for reducing belief and asking family members was the most frequently mentioned memory verification strategy. Reports categorized as NBMs were more likely to include mention of memory verification strategies than were believed memories.

Keywords: False Memory; Nonbelieved Memory; Memory Verification

General Audience Summary

False memories or memories for events/details that were not experienced can occur to everyone. As part of an artwork called the False Memory Archive, the artist -Alasdair Hopwood- has been collecting false memory reports from the general population. People who submitted these reports were aware that these memories were false. We took a closer look at a random sample of these statements and found that the majority could be categorized as nonbelieved memories. Nonbelieved memories are memories for events of which people have reduced the belief that the event actually occurred. Furthermore, we found that such nonbelieved memories were mainly the result of other people telling the submitters that their memory was incorrect. Our results show that belief-memory dissociations are quite normal in the general population.

Nonbelieved Memories in The False Memory Archive

Scientific discoveries frequently inspire artists to develop creative artwork. In the current paper, we do the reverse by presenting a scientific study that was inspired by art. We examined an artwork called the False Memory Archive developed by the London-based artist Alasdair Hopwood. The artwork contains a unique assemblage of vivid personal memories of events that the contributors -the general public- claim never happened. Our aim was to describe the reasons for why people decided that their memories might be false, and the verification strategies people use to validate their memories.

When we retrieve a memory for an event, we generally also hold a strong belief that this event occurred. However, studies have revealed a counterintuitive class of memories for events where belief that the remembered event occurred is reduced or absent called nonbelieved memories (NBMs; for a review, see Otgaar, Scoboria, & Mazzoni, 2014). Despite retaining vivid mental representations of the event accompanied by feelings of re-experiencing, people report a reduction in the belief that the remembered event actually occurred. NBMs might have started out as false memories which are correctly rejected later, called refuted memories. However, NBMs can also be incorrectly rejected true memories, called disowned memories (Mazzoni, Scoboria, & Harvey, 2010).

Submissions to the False Memory Archive formed part of an international art project. The artist, Alasdair Hopwood, was inspired by research demonstrating the malleability of memory. Based on this research, Hopwood worked in collaboration with several international memory researchers to develop a series of exhibitions that contain objects, text, videos, and photography, as well as a written collection of personal accounts of experiences that never occurred. One aim of the archive is to show the public how the past is constantly reconstructed which might lead to "humorous, obscure and uncomfortable things people have misremembered" (Hopwood,

http://www.falsememoryarchive.com). Visitors to the False Memory Archive exhibitions were invited to describe a memory of an event of which they now know never happened. As such, the False Memory Archive provides an ideal opportunity to analyze potential NBM reports from the general population. One key advantage of analyzing these memory reports is that individuals who contributed to the Archive were not aware that they were taking part in research. In most prior studies of false memories and NBMs, individuals have been aware and were compensated for their participation. Such awareness may have affected the information that these participants chose to provide. For example, participants might have been more willing to tell a story -true or false- than submitters of the False Memory Archive.

In the current study, we analyzed reports submitted to the False Memory Archive. By gaining a better understanding of false memories and NBMs in the real world, we can help to advance theories of memory. Specifically, we examined whether the reports submitted to the archive referred to false memories and/or to NBMs, and examined the reasons that people provided as to why belief in these memories was retracted.

Studies on Nonbelieved Memories

In the first empirical study of NBMs, Mazzoni and colleagues (2010) found that 20% of those asked were able to retrieve a NBM. However, participants were explicitly cued to do so; a procedure that might lead to an overestimation of the frequency of NBMs in the general population. Scoboria and Talarico (2013) examined how frequently NBMs would occur without participants being directly cued to report them. In three studies, participants retrieved autobiographical experiences after which these were rated on belief in occurrence (i.e., truth value attributed to an event) and recollection. They found that 3% to 3.8% of participants reported autobiographical memories that scored higher on recollection than belief in occurrence which they classified as NBMs.

Besides retrospective accounts of naturally occurring NBMs (see also e.g., Brédart & Bouffier, 2016), researchers have also elicited NBMs experimentally. Otgaar, Scoboria, and Smeets (2013) falsely told children and adults that they experienced a childhood hot air balloon ride. During two interviews, a significant minority of participants (36%) indicated that they came to remember this (false) event. Crucially, after the last interview, participants were informed that the suggested event never actually occurred, and participants' belief in the occurrence and their memory for the false event were measured. Forty percent of those who reported remembering the false event claimed to have a NBM after the debriefing.

Other studies have shown that NBMs can be experimentally created using a variety of methodologies including doctored video clips of fake actions (Clark, Nash, Fincham, & Mazzoni, 2012). When informed about the false actions, participants reported decreases in belief in occurrence while maintaining a strong sense of recollection. Although this study concentrated on inducing NBMs for false (non-performed) actions, studies have shown similar findings when challenging memories for true experienced events (e.g., Mazzoni, Clark, & Nash, 2014; Otgaar, Scoboria, Howe, Moldoveanu, & Smeets, 2016; Scoboria, Otgaar, & Mazzoni, 2018). Together, the research to date shows that NBMs are not uncommon in the general population and can be elicited and manipulated experimentally.

Reasons to Reduce Belief

Previous work has examined reasons why people decide to withdraw belief in the occurrence of remembered events. Mazzoni et al. (2010) identified three types of reasons. The first and most frequently mentioned reason involved other people telling the participants that the memory was incorrect. For example, a sibling might have stated that the event actually happened to another family member. The second category referred to events being too implausible to have actually happened (e.g., recalling seeing a living Dinosaur). The last category concerned

contradictory evidence regarding the memory such as discovering a photograph challenging whether a certain event was indeed experienced (see Scoboria, Boucher, & Mazzoni, 2014 for similar results).

Theoretically, research on the reasons for reducing belief in occurrence parallels strategies that people use to verify memories that have been brought into question (Wade & Garry, 2005; Wade, Nash, & Garry, 2014; Nash, Wade, Garry & Adelman, 2017). These studies indicate that people evaluate the costs and reliability when choosing how to verify personal memories and tend to prioritize lower cost (in terms of the effort required to pursue a memory verification strategy) over reliability when picking a strategy. In these studies, participants primarily reported that they would rely on other people to validate memories. The chief motive for gleaning information from others is that relying on other people is a relatively cheap and easy way to verify one's memories. This might also clarify why social feedback is the primary reason why people reduce their belief in the occurrence of events. In contrast, receiving or finding nonsocial external evidence is less often reported as a verification strategy. Albeit a potentially more reliable source, searching for nonsocial external evidence such as legal documents or photographs requires more time and energy, making it less likely that people use this strategy and hence it is less likely to play a role in belief withdrawal.

Method

Sample

Hopwood has been collecting false memory submissions online (via https://www.arhopwood.com/fma) and in six European museums: [1] The Mead Gallery at the University of Warwick, UK; [2] the Talbot Rice Gallery at the University of Edinburgh, UK; [3] the Newlyn Art Gallery, UK; [4] The Exchange, UK; [5] The Freud Museum, London, UK; [5] Carroll/Fletcher London; and [6] the Schunck Museum, Heerlen, Netherlands). Parts of the work

have also been displayed at Warwick Arts Centre in the UK, ADM gallery in Singapore, and the

French Cultural institute in Boston, US. Total visitors to events and exhibitions on the UK tour

was 18191 visitors in 213 days of exhibition time.

For the current study, we only analyzed English submissions that were collected from

exhibitions in the UK and online. At the time of the current analysis, a total of 805 submissions

had been collected. Contributors to the Archive received the same instructions, regardless of

whether they were submitting online or in-person. Specifically, they were told:

> "We are collecting false memories for a False Memory Archive. You can
>
> anonymously submit a false memory by using the form overleaf or by going to:
>
> falsememoryarchive.com. The false memory can be your own or it can belong
>
> to someone else."

Although the instructions were the same, the context was different. During the

exhibitions, people received more information about the phenomenon of false memories

than people who submitted their false memory report online.

The accounts in the False Memory Archive vary dramatically, ranging from impossible

memories of pre-birth experiences to possible memories of, for example, holidays. This

collection lends itself perfectly to the study of NBMs because the submissions, according to the

archive, follow a pattern that is linked to research on the reasons for why people reduce belief.

Specifically, according to the website of the False Memory Archive (see

https://www.falsememoryarchive.com/anthology): "a memory is described, only to be undone by

evidence that the recollection is faulty or by a suspicion that the experience never actually

occurred." We were only interested in personal submissions and excluded submissions referring

to other people's memories. We randomly selected 500 submissions to code for our analyses. All

coded responses are available on the Open Science Framework (https://osf.io/nk54r/).

Demographic information for those who submitted reports to the False Memory Archive is

unknown. However, there are some general demographic data on people visiting museums made

within the past year. In England, in 2017/2018, about half of the population (from all age-groups)

visited a museum or gallery (age range 16-74; 48.1% of 16-24 year olds, 53.2% of 25-44 year

olds, 52.3% of 45-64 year olds, 52.7% of 65-74 year olds; Statista, 2019). American data show

that most museum visitors are white and well-educated (Farrell & Medvedeva, 2010).

Predictions

Our predictions were as follows. We anticipated that the majority of false memory

submissions could be categorized as nonbelieved memories. This prediction is based on the idea

that if people submit a false memory, they are aware that they at some point believed that the

memory was genuine and then at some point their belief that the event occurred was reduced.

Also, in line with previous findings (Scoboria et al., 2015), we predicted that social feedback

would be the most frequently reported category for why participants decided that their memory

was false. Finally, based on previous work (Ost, 2017; Wade et al., 2014), we expected that

asking family members would be the most reported memory verification strategy, and we

explored whether previous categorizations of verification strategies fully captured the range of

strategies present in the archive or whether previously undocumented memory verification

strategies emerged.

Coding

Submissions were coded using an adapted coding scheme based on Scoboria et al.

(2017) and Ost (2017). The coding scheme contained three main components. First, the scheme

described how to code reports on whether the submitter believed and/or recollected the event.

Second, the scheme described how to code the reasons for why submitters reduced belief in the

occurrence of events. Finally, details were provided to judge the presence of memory verification

strategies.

More specifically, we first determined the extent to which each contributor appeared to

believe and recollect the event described in the report. Categories were taken from Scoboria,

Boucher et al. (2015), Scoboria et al. (2017), and Ost (2017), and some were slightly changed for

the current investigation (i.e., we did not include all subcategories of social feedback from

Scoboria et al.). Categories included (1) Judged memory, (2) Judged belief, (3) Explicit

statement of having a memory, (4) Explicit statement of having no memory, (5) Explicit

statement of having a belief in occurrence, (6) Explicit statement of having no belief in

occurrence, and (7) Acceptance of Events. From these categories the quality of the submissions

in terms of memory and belief in occurrence was inferred, forming the categories of (1) Non-

believed memory (NBM; stating memory, stating no belief in occurrence), (2) Believed memory

(BM; stating memory, stating belief in occurrence), (3) Believed-not-remembered events (BNRs;

stating no memory, stating belief in occurrence), and (4) Non-believed-not-remembered events

(NBNRs; stating no memory, stating no belief in occurrence).

The following guidelines were used to categorize submissions: an event was judged to be

recollected (Judged memory = 'Yes') based on the presence of a positive and lack of negative

memory statement about the event, as well as the coder's general impression that the memory

was associated with vivid recollection. Moreover, the coding of 'acceptance' was used as a

guideline for when belief in occurrence was or was not present. The extent to which an event was

accepted (to have occurred) was coded on a scale of outright rejection (0) to full acceptance (3).

The status of the report was based on whether any reports were present regarding belief in

occurrence, other information about the truth status, and the coder's judgement. Reports were

defined as believed to have occurred if the acceptance score was 2 or higher on the scale. Table 1 summarizes which combination of scores led to which memory-belief category.

Table 1

Memory-belief Cross-classifications

	Judged memory: Yes (2)	Judged memory: No (0)
Acceptance of events: High (2/3)	Believed memory (1)	Believed-not-remembered event (3)
Acceptance of events: Low (0/1)	Nonbelieved memory (2)	Non-believed-non-remembered event (4)

In the second step of coding, we investigated the reduction or withdrawal of belief. Here only submissions coded as NBMs and NBNRs were considered, since these represent all submissions for which belief in occurrence decreased. The categories from Scoboria, Boucher et al. (2015) were included complemented by two additional categories – the 'Change of Context' and 'Noticing Deterioration' categories identified by Ost (2017). Thus, the categories coded for reasons for belief reduction were: (1) Social feedback [including the subcategories: a) being told the event did not occur, b) being told the event happened differently, c) being told that the event is impossible, d) being told the event happened to someone else, e) being told the event is unlikely, f) disconfirming non-verbal feedback, g) being told that the submitter was not present at the event, h) lack of corroboration, i) others unavailable (e.g., important other people are not available to confirm the event), j) the submitter was pressured by another/others to stop believing in the memory, k) another/others refused to discuss the event, l) other social feedback]; (2) Event plausibility [a) general event plausibility (refers to how objectively plausible the event is to happen in general, not taking into account information that applies only to the submitter

specifically), b) specific event plausibility (refers to reports by the submitters as to how plausible the event is for the submitter specifically, in his/ her life; e.g., if someone submitted a memory of fighting with a sibling, this report would be generally plausible. However, if the person who submitted this report did not have any siblings, then this event would not be plausible for this person specifically)]; (3) Alternative attributions [a) internal/ asleep, b) internal/awake, c) other mental state, d) external]; (4) General Beliefs about Memory [a) memory and age, b) about the integrity of memory, c) about the ongoing influence of memory]; (5) Internal memorial characteristics (qualities associated with the mental representation for the event); (6) Notions of self/others [a) memory is incompatible with self-image or image of others, b) memory is incompatible with image of others]; (7) External evidence [a) disconfirmatory evidence obtained, b) confirmatory evidence not obtained]; (8) Personal motivation to reduce belief for the memory; (9) Change of Context (refers to cases in which a change of social situation, location, or medical treatment induced a change in belief), (10) Noticing deterioration (refers to cases in which submitters realize that psychological treatment/counselling they are receiving is not leading to improvement, leading to a reduction in belief for memories discussed during therapy), (11) Other, and (12) No information regarding reasons for withdrawal of belief given (see Table 2 for definitions of each reason). The lack of explanation for why belief was retracted in some submissions created the need to include the final category; this is one important way in which the convenience sample in the False Memory Archive differs from studies of NBMs in which the method typically involves asking people to describe reasons for reducing belief.

In the third step, the coding scheme developed by Ost (2017) and the categories reported by Wade and Garry (2005) were used to identify memory verification strategies that were mentioned in submissions. Additionally, a check of whether a verification attempt was reported in general was included before coding the subcategories. This was deemed necessary since not

all submitters reported attempting verification. Therefore, the following categories were included: (0) General verification, if yes: (1) Checking with family, (2) Checking with others, (3) Searching for additional cues, (4) Searching for physical evidence, and (5) Cognitive techniques (see Table 3 for definitions of each strategy).

The second author coded the reports using this coding scheme. The full coding scheme including all details on coding definitions and categories, a list of abbreviations, and a list of the decision rules used are available on the Open Science Framework (https://osf.io/nk54r). A second rater coded the memory/belief quality of 50 reports. Interreliability was substantial: Cohen's kappa = 0.69 (Landis & Koch, 1977).

Table 2

Reasons for Belief Withdrawal

Reason for Belief Withdrawal	Definition/ Explanation
Social Feedback (SF)	Exchanges with other people lead to invalidating information and this feedback is the reason to reject that the remembered events occurred
SF1	Feedback that the remembered events did not occur
SF2	Feedback that the remembered events happened differently
SF3	Feedback that the remembered events are impossible

SF4	Feedback that the remembered event(s) happened to someone else
SF5	Feedback that the occurrence of the remembered event(s) is unlikely
SF6	Non-verbal disconfirming feedback that the memory might be false
SF7	Feedback that the submitter was not present at the recollected event
SF8	Feedback that the memory cannot be corroborated/ confirmed by others
SF9	Other people important to the remembered event(s) are not available to give feedback
SF10	The submitter was pressured by others to stop believing in the memory and starts to mistrust that person
SF11	Others refuse to discuss the events with the submitter
SF12	Other disconfirming social feedback was obtained
General Event Plausibility	The occurrence of the event(s) is not possible in general, not taking the specific position of the submitter into account

Specific Event Plausibility	The occurrence of the event(s) is not possible for the submitter specifically, even if in general these events could have happened to someone else
Alternative Attributions (AA)	The recollection is allocated to an origin in a source other than real life experience
AA1	Events attributed to internal, mental images while asleep (e.g., dreaming)
AA2	Events attributed to an internal source while awake (e.g., imagination)
AA3	Events attributed to fabrication while in another mental state (e.g., hallucination, intoxication, exhaustion)
AA4	Events attributed to confusion between external sources and experiences (e.g., books, TV)
General Beliefs (GB)	Changed belief due to general beliefs about memory and memory ability
GB1	Beliefs about memory during childhood (e.g., memory cannot occur before a certain age, childhood memories are unreliable)
GB2	Beliefs about the integrity of memory (e.g., memory can be false)

GB3	Beliefs about influence of memory (e.g., memories should have an ongoing influence on behavior)
Internal Features of Event Representation	Internal features such as sensations, images, emotions are abnormal for a memory
External Evidence (EE)	Found external evidence (not from a social exchange) indicating that the recollected event(s) could not have occurred
EE1	Evidence is found that disconfirms the memory events
EE2	Evidence to confirm the memory cannot be found
Notions of Self/ Other (NSO)	Occurrence of event(s) is incompatible with submitter's self-concept or image of another person
NSO1	Occurrence of event(s) is incompatible with the submitter's self-image
NSO2	Occurrence of event(s) is incompatible with the submitter's image of another person
Personal Motivation	Personal motivation to invalidate the recollection for some self-benefit
Change of Context	Change in belief due to change in social situation or location

Noticing Deterioration	Change of belief after submitter noticed that treatment they are getting is not improving their condition, so that memories from during the treatment time are questioned
Other	Belief is changed due to some other reason not listed above
No information	No information was given to indicate why belief was withdrawn

Table 3

Verification Strategies

Verification Strategy	Explanation/ Definition
General Attempt at verification	The submitter actively tried to verify their memory (e.g., by actively searching for more information)
VS1	Asked family members whether details/ or the complete remembered event(s) are true
VS2	Asked people other than family members whether details/ or the complete remembered event(s) are true (e.g., friends, acquaintances)

VS3	Sought out locations or cues to cue recall and verify their memory (e.g., returning to the event location)
VS4	Searched for physical evidence compatible with the memory (e.g., scars, newspaper articles)
VS5	Purposefully used cognitive techniques (e.g., trying to remember more of the event) to verify memory events

Results

Nonbelieved Memories

As predicted, more than half of the submissions were categorized as nonbelieved memories ($n = 267$, 53.4%). An example of a NBM from the archive is: "*I remember getting lost in a national park as a 6 year old child. I even remember the conversation with my parents. There was a hill, I said I'd go round one way and they'd go the other and we'd meet on the other side. Only when I reached the other side they weren't there [...]. I was picked up by a park ranger, rode in the back of his open back truck. Was taken to a shop[...]. I remember hearing notice of a lost child going over the tannoy for my parents to come and pick me up, which they did. I remembered and believed all this for over 30 years until one day I asked my parents if they remember it. They both [...] swore blind that it never happened. I believe them, they would definitely remember something like that [...] I now believe I'd dreamt it.*"

A large percentage of the reports were coded as believed memories ($n = 208$, 41.6%). An example is the following: "*When I was approximately 6 years old, I was visiting my older*

cousin's house. I recall brawling with him in his room with my older sister watching from the bunk bed. I then had both of my front teeth knocked out of my mouth. His mother then told me I would get £2 from the tooth fairy etc. and I placed my teeth near a sink, which they later fell down/went missing; and I was given £2. Later I was told by my parents they don't remember it [...]. [My cousin and aunt do] not remember either. However, to this day I believe it's real [...]".

A minority of reports were coded as believed-not-remembered events ($n = 11$; 2.2%) or not-believed-not-remembered events ($n = 14$, 2.8%).
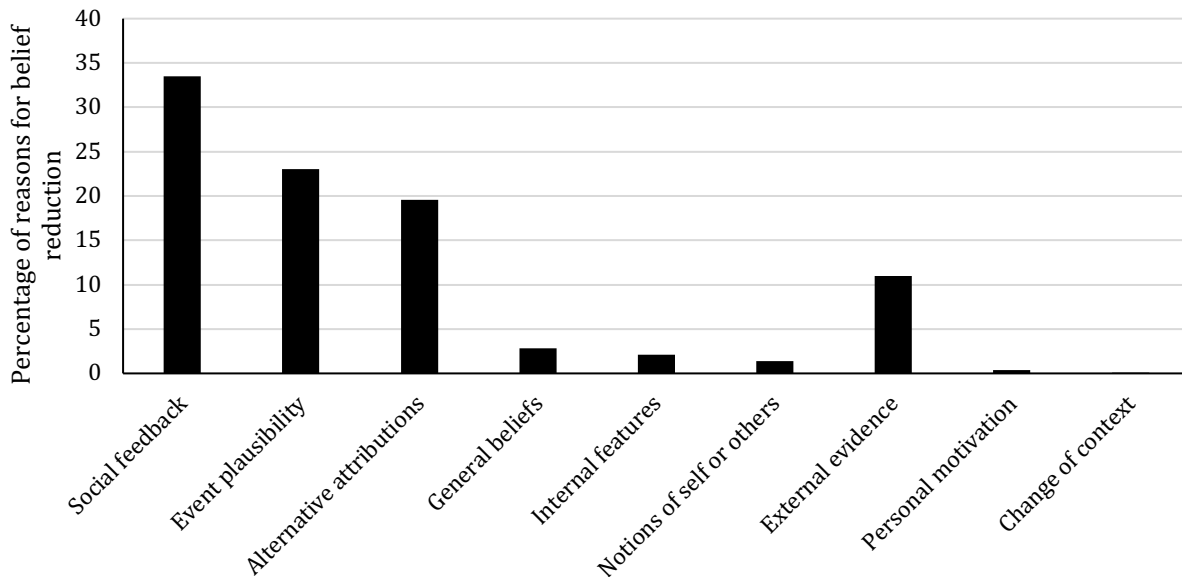

Figure 1. Reasons for Belief Reduction

Reasons for Belief Reduction

To analyze the reasons for belief reduction, we focused on memory reports in which belief was reduced or relinquished and hence focused on nonbelieved memories or non-believed-not-remembered events ($n = 281$). As expected, and consistent with Scoboria, Boucher and Mazzoni (2014) social feedback was the most frequently mentioned category ($n = 94$, 33.5%; see Figure 1). Also consistent with their study, within the social category being told that the event

did not occur was the most frequently mentioned sub-category, 44.7% (42/94); *n* = 42. For

example, one individual wrote: "*I can vividly remember attending a wedding, aged around 5,*

where there was a grape juice fountain built out of stone in the corridor. [...] I have always

counted this as one of the weddings I had been to until a couple of years ago (aged about 25) my

mum said it had never happened.".

Other reasons were the following (most to least frequent): Alternative attributions was

stated as a reason in 19.6% (*n* = 55) of cases, specific event plausibility in 12.8% (*n* = 36) of

cases, external evidence in 11% (*n* = 31) of cases, general event plausibility in 10.7% (*n* = 30) of

cases, general beliefs in 2.8% (*n* = 8) of cases, internal features in 2.1% (*n* = 6) of cases, notions

of self and others in 1.4% (*n* = 4) of cases, change in context in 0.1% (*n* = 2) of cases, and

personal motivations in 0.4% (*n* = 1) of cases. Of those who reduced belief due to general beliefs

(*n* = 8), 87.5% (*n* = 7 out of 8) did so because of general beliefs about the functioning of memory

(e.g., *"[...] I remember my mum bringing home my baby brother from [the] hospital when I was*

18 months old, and me prodding him in his baby basket. I remember it was in the living room

and where he was placed on the floor, but I was too young to remember this happening [...]")

and 12.5% (*n* = 1 out of 8) due to general beliefs about memory integrity.

For some of the primary categories, several subcategories were identified. For example,

for the alternative attributions category, 52.7% (*n* = 29 out of 55) of submitters indicated

attributing the memory to an internal source while asleep (e.g., dreaming, "*When I was about 10*

I had a memory of having my arm stitched at a local hospital [...]. Thinking about it, it must have

been a very vivid dream that I confused with "reality"") while 32.7% (*n* = 18) reduced belief

because they attributed the memory to an external source (e.g., movie, photograph). Also, 14.5%

(*n* = 8) viewed their memory as originating from an internal source while being awake (e.g.,

imagination, "[...] *A little later one of the kids reported seeing someone in the woods near the*

cabin. A teacher got into the minibus, put the headlights on and slowly drove towards the woods where this person had supposedly been. I remember walking alongside the minibus holding onto the wing-mirror. Suddenly a man in a Halloween mask jumped out from behind a tree 10 feet in front of me, screamed, then ran off. [...] I can only think now that I'd imagined [...] the whole thing") and one person (1.8%) ascribed their memory to another mental state (intoxication).

       With regards to retracting a belief because of nonsocial external evidence, 83.9% ($n = 26$) did so because they received nonsocial external evidence disconfirming the authenticity of their memory (e.g. legal documents, pictures) and 16.1% ($n = 5$) of the people retracted belief because they failed to find any evidence confirming memory (e.g., lack of scars, *"I thought I remembered putting a garden fork through my foot [...]. My memory was attempting to use the fork to dig but accidentally striking my wellington boot and into my foot. However, I have no scars! [...]"*).

       Comparison with Scoboria et al. (2015) and Ost (2017). To examine whether our data on the reasons for belief reduction mirrored previous work, we compared our observed percentages with those found in Scoboria et al. (2015) and Ost (2017; see Table 5). The most notable result was that social feedback was the most frequently mentioned reason for why people changed belief.

Table 5

Reasons for Belief Retraction

Reasons for Belief Retraction	Scoboria et al. (2015)	Ost (2017)	False Memory Archive
Social Feedback	53.0% ($n = 198$)	19.6% ($n = 31$)	33.5% ($n = 94$)
Event Plausibility	35.0% ($n = 132$)	1.8% ($n = 3$)	23.0% ($n = 66$)
Alternative attributions	30.0% ($n = 108$)	1.2% ($n = 2$)	19.6% ($n = 55$)

General beliefs	18.0% (*n* = 67)	0.6% (*n* = 1)	2.9% (*n* = 8)
Internal features of event presentation	16.0% (*n* = 61)	2.5% (*n* = 4)	2.1% (*n* = 6)
Notion of self or others	12.0% (*n* = 45)	0.0%	1.4% (*n* = 4)
External evidence	10.0% (*n* = 40)	27.2% (*n* = 43)	11.1% (*n* = 31)
Personal motivation	4.0% (*n* = 16)	1.8% (*n* = 3)	0.4% (*n* = 1)
Change of context	-	12.0% (*n* = 19)	0.7% (*n* = 2)
Noticing deterioration	-	2.5% (*n* = 4)	0.0%

Memory Verification Strategies

We found that 10.6% (*n* = 53) of the sample mentioned that they attempted to verify their memory. Of these people, 52.8% (*n* = 28) indicated trying to verify their memory by asking family members (e.g., *"I remember meeting Elton John at a bar in New York when I was about 8. I remember going to ask him for napkins and an autograph b[ut] I've asked my mother and she says that it never occurred. [...]"*).

Furthermore, 9.4% (*n* = 5) asked others (e.g., friends), 7.5% (*n* = 4) searched for cues (e.g., returning to the event location or sought out situations to cue recall, *"[my memory is] being in China and going to visit a huge Buddha temple. The temple was impressive. Few years later I [visited] China. And I went to [the] place where the temple was [...]."* or *"I too believed I could fly as a small child of about 2-3. I tried in vain to re-establish this ability until quite a bit older.... [...]"*), 39.6% (*n* = 21) looked for physical evidence (e.g., photos), and 5.7% (*n* = 3) used cognitive strategies (e.g., trying to remember more of the event or engaged in reasoning about the event, *"About thirty years ago a friend and I were climbing a mountain in Switzerland. [...] I recall we stayed roped since I recall thinking that I should jump to the opposite side of the*

ridge if [my companion] slipped - he was leading. [I think we stayed roped] because these days

it might seem prudent to unrope as then only one might fall but there is still debate over this -

current thinking has influenced his memory. I am certain that my recollection is the correct

one"). The percentages do not add up to 100% because some submissions included more than

one verification strategy.

We also examined whether the use of memory verification strategies differed between

believed and nonbelieved memories. We found that in reports categorized as nonbelieved

memories, memory verification strategies were mentioned statistically more frequently ($n = 40$)

than in those categorized as believed memories ($n = 12$; χ^2 (1) = 10.18, $p = .001$, Cramer's $V =$

0.15).

Comparison with Wade and Garry (2005) We compared our data with previous

memory verification work (Wade & Garry, 2005; see Table 6). An important observation was

that in our data and Wade and Garry's (2005) paper, asking family members was the most

frequently mentioned strategy. Furthermore, looking for physical evidence was a seldom used

strategy in Wade and Garry's (2005) work while we found that it was often mentioned in the

false memory submissions.

Table 6

Memory Verification Strategies

Verification Strategies	Wade and Garry (2005)	False Memory Archive
Asking family member	56.7% ($n = 20$)	52.8% ($n = 28$)
Asking others	15.0% ($n = 5$)	9.4% ($n = 5$)

Looking for cues	3.0% ($n = 1$)	7.5% ($n = 4$)
Looking for physical evidence	3.0% ($n = 1$)	39.6% ($n = 21$)
Using cognitive strategies	28.0% ($n = 10$)	5.7% ($n = 3$)

Discussion

We analyzed reports submitted to the False Memory Archive to examine why people reduced belief in memories and the strategies that they used to verify them. We found that many archival reports could be classified as NBMs. Furthermore, social feedback was provided as the main reason for why people viewed their memory as being false and relying on family members to validate the memory was the most common verification strategy.

The instruction to submit a false memory led many people to submit a NBM. Of course, NBMs are believed to be 'false memories' by the person possessing the memory, although these memories might actually refer to either false or truly experienced events. The fact that they are aware that the memory is false might have resulted in people reducing or surrendering belief that the remembered event took place despite retaining a sense of recollection for the event. Nonetheless, a large percentage of the remaining reports were classified as believed memories (41.6%) which might be regarded as surprising in a source of reports that people provide about false memories. Thus, although people who submitted these reports assumed that their memory was false, their reports indicated there was still a strong belief that the event took place. Perhaps these memories were actually NBMs, but because submitters were not asked *specifically* to provide reasons for why their memory was false, they did not mention them. The consequence is that these reports "look" like believed memories due to the language that people chose to use when describing them (Otgaar et al., 2013). Although these findings might be considered surprising, they fit well with previous research on different types of NBMs (Scoboria et al.,

2017). In that research, people sometimes have NBMs they still largely believe, but are only

modestly unsure about (i.e., "grain of doubt" NBMs).

Alternatively, the high percentage of believed memories in this archive may be linked to

cognitive dissonance theory. Here, when there is disagreement between different sources of

information, people attempt to resolve the discrepancy (Festinger, 1957). This can transpire in

several ways (Scoboria et al., 2014). First, people might distrust their memory leading to the

formation of a NBM. Second, they might reject the contradictory information thereby defending

their memory (see also Scoboria, Otgaar, & Mazzoni, in press; Sheen, Kemp, & Rubin, 2001).

Third, they might decide to appraise the remembered event as less important, independently of

whether they revise the belief that the event occurred.

Regarding the reasons that people noted to reduce belief, social feedback was the most

often reported reason. This is in line with previous research by Scoboria et al. (2015) and Ost

(2017). Interestingly, when comparing the percentages of our study with those reported in

Scoboria and colleagues' and Ost's study (see Table 5), our results are most in line with Scoboria

et al.'s study (2017). That is, in Ost's study, external evidence was mentioned relatively more

often than in our study and in Scoboria et al.'s study. Of course, the explanation for this finding

is that Ost's sample concerned highly serious and negative events (i.e., sexual abuse). Ost

explained that in his sample, retractors encountered external evidence in the form of, for

example, newspaper articles that were critical about the experiences that the retractors reported.

Similarly, event plausibility was rarely mentioned in Ost's study while this was frequently

reported in our study and in Scoboria et al's study. Here too, this might be related to the fact that

in our and in Scoboria et al.'s samples, certain stories were highly bizarre and hence, implausible

(e.g., memories of flying). In Ost's sample, statements were predominantly about traumatic

events (sexual abuse) that are much more plausible than some of the stories of our and Scoboria

et al.'s work. Likewise, in our study, we found substantial evidence that submitters searched for physical evidence to verify their memories while this was minimally mentioned in Wade and Garry (2005)'s study. One plausible explanation for this result might be the context of the different studies. That is, the submissions in our study were part of an art project in which submitters were exposed to physical sources such as photos and videos related to false memory creation which might have triggered submitters to mention physical evidence in their statements.

Regarding people's attempts to verify their memories, people preferred to use more cheap-and-easy strategies (i.e., asking their family members) than strategies that required more investment of time and/or energy (e.g., asking people other than family, searching for physical evidence). Moreover, NBMs were more likely to contain memory verification strategies than were believed memories. Perhaps people tried to verify the authenticity of the memory causing them to reduce belief in the occurrence of the memory. For example, people might have asked one of their family members to validate a memory and when this member suggested that the memory was false, people might have altered belief for the remembered event.

Findings concerning the reasons for relinquishing belief and verification strategies broadly fit within the source monitoring framework (Nash, Wade, Garry, & Adelman, 2017). Source monitoring, in part, refers to the processes that people use to differentiate between events that truly happened from events that were, for example, imagined (Johnson, Hastroudi, & Lindsay, 1993). Work in this area has focused on mental heuristics such as the qualities of memories (e.g., strength of visual details) that are frequently diagnostic of experienced events (e.g., D'Argembeau, van der Linden, d'Acremont, & Mayers, 2006; Destun & Kuiper, 1999; Johnson, Foley, Suengas, & Raye, 1988). The work reported here relates to a systematic form of source monitoring in which people might actively search for evidence (e.g., memory

verification) for the authenticity of their mental representations. Because of this search, people

may come to reappraise their mental representation as false which might lead to NBMs.

Blank (2017) suggests that there are many different examples of dissociations of belief

and recollection. For example, déjà vu can be considered a phenomenon where people have a

sense of recognition accompanied by a feeling that this sense is inaccurate (Brown, 2003).

Another example is a state of memory distrust in which people lack confidence in their own

experienced events which has sometimes been linked with the occurrence of false confessions

(Gudjonsson, 2014; Van Bergen, Jelicic, & Merckelbach, 2009). According to Blank, these

recollection-belief dissociations show that before people stop believing in their recollections,

they first go through a "reality check" that may include seeking evidence that a memory reflects

an accurate representation of what happened. When such reality checks fail, dissociations

between recollection and belief might occur. Perhaps the NBMs in archival accounts analyzed

here were the result of such failed reality checks.

Although the archive does not contain any demographic data concerning the submitters

(e.g., age, gender), we do know that the archive concerns submissions from the general

population. On the one hand, the archive may therefore be more diverse than previous studies

focusing on college students or MTurk participants who are provided compensation (Mazzoni et

al., 2010; Scoboria et al., 2015) and hence may be more generalizable to real-words settings. On

the other hand, demographic data on people visiting museums show that they are largely white

and well-educated but do seem to be quite equally divided among different age groups.

A limitation of the current experiment is that although substantial agreement was found

between different raters, this agreement might have been higher when using a shorter scoring

form. That is, in the current study, raters used an extensive scoring form which might have made

the scoring of submissions challenging. Of course, even with this detailed scoring form, our

results are in line with previous results in this area (e.g., Scoboria et al., 2015). Nevertheless, future research might attempt to use shorter and perhaps more simple scoring forms. Second, in the current study, people who submitted a false memory account received little guidance on what they should exactly report. The likely consequence of this is that the submissions varied much in content. In previous work on the reporting of nonbelieved memories, participants received more guidance on the events that occurred in their childhood. For example, participants were specifically asked to think about events from their childhood and had to insert a short description of each event which could serve as memory cue of the event (Scoboria & Talarico, 2013).

In sum, the current study focused on reports from the False Memory Archive. Many of these reports were judged to be NBMs. Submitters described that social feedback led them to believe that their memory was false and that they often approached family members to verify their memory. This study emphasizes the flexibility that exists in autobiographical belief and supports the view that autobiographical belief and recollection reflect distinct underlying processes (Scoboria et al., 2014).

References

Clark, A., Nash, R. A., Fincham, G., & Mazzoni, G. (2012). Disowned recollections: Denying true experiences undermines belief in autobiographical events. *PLoS One, 7*, 1-7 e32998.

Blank, H. (2017). Recollection, belief and metacognition: A reality check. *Memory, 25,* 869-875.

Brédart, S., & Bouffier, M. (2016). Nonbelieved memories in middle-aged and older people. *Consciousness and Cognition, 42,* 352-357.

Brown, A. S. (2003). A review of the déjà vu experience. *Psychological Bulletin, 129,* 394-413.

D'Argembeau, A., Van der Linden, M., d'Acremont, M., Mayers, I. (2006). Phenomenal characteristics of autobiographical memories for social and non-social events in social phobia. *Memory, 14,* 637-47.

Destun, L. M. & Kuiper, N. A. (1999). Phenomenal characteristics associated with real and imagined events: The effects of valence and absorption. *Applied Cognitive Psychology, 13,* 175-186.

Farrell, B., & Medvedeva, M. (2010). *Demographic transformation and the future of museums.* The AAM Press, American Association of Museums.

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Foley, M.A. (2017). Reflecting on how we remember the personal past: Missing components in the study of memory appraisal and theoretical applications. *Memory, 26*, 634-652.

Gudjonsson, G. (2014). How I got started: From memory distrust to false confessions. *Applied Cognitive Psychology, 28,* 809-811.

Johnson, M. K., Foley, M. A., Suengas, A. G., & Raye, C. L. (1988). Phenomenal characteristcis of memories for perceived and imagined autobiographical events. *Journal of Experimental Psychology: General, 117*, 371-376.

Johnson, M. K., Hashtroudi, S., & Lindsay, S. (1993). Source monitoring. *Psychological Bulletin, 114*, 3-28.

Landis, J.R., & Koch, G.G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33,* 159-174.

Maran, M. (2010). *My lie: A true story of false memory.* San Francisco, CA: Jossey-Bass.

Mazzoni, G., Clark, A., & Nash, R. A. (2014). Disowned recollections: Denying true experiences undermines belief in. *Acta Psychologica, 145*, 139-146.

Mazzoni, G., Scoboria, A., & Harvey, L. (2010). Non-believed memories. *Psychological Science, 21*, 1334-1340.

Nash, R. A., Wade, K. A., Garry, M., & Adelman, J. (2017). A robust preference for cheap-and-easy strategies over reliable strategies when verifying personal memories. *Memory,* 25, 890-899. doi: 10.1080/09658211.2016.1214280

Ost, J. (2017). Adults' retractions of childhood sexual abuse allegations: high stakes and the (in)validation of recollection. *Memory*, 1-10.

Otgaar, H., Scoboria, A., Howe, M.L., Moldoveanu, G., & Smeets, T. (2016). Challenging memories in children and adults using an imagination inflation procedure. *Psychology of Consciousness: Theory, Research, and Practice, 3*, 270-283.

Otgaar, H., Scoboria, A., & Mazzoni, G. (2014). On the existence and implications of nonbelieved memories. *Current Directions in Psychological Science, 23*, 349-354.

Otgaar, H., Scoboria, A., & Smeets, T. (2013). Experimentally evoking non-believed memories for childhood events. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 39*, 717-730.

Scoboria, A., Boucher, C., & Mazzoni, G. (2015). Reasons for withdrawing belief in vivid autbiographical memories. *Memory, 23*, 545-562.

Scoboria, A., Jackson, D. L., Talarico, J., Hanczakowski, M., Wysman, L., & Mazzoni, G.

    (2014). The role of belief in occurrence within autobiographical memory. *Journal of*

    Experimental Psychology: General, 143, 1242-1258.

Scoboria, A., Mazzoni, G., & Boucher, C. (2016). Nonbelieved memories: A review of findings

    and theoretical implications. In R. A. Nash, & J. Ost, *False and distorted memories.*

    online: psychology press.

Scoboria, A., Nash, R. A., & Mazzoni, G. (2017). Sub-types of nonbelieved memories reveal

    differential outcomes of challenges to memories. *Memory, 25*, 876-889.

Scoboria, A., Otgaar, H., & Mazzoni, G. (2018). Defending and reducing belief in memories: An

    experimental laboratory analogue. *Memory & Cognition*, 1-17. DOI: 10.3758/s13421-

    018-0800-1

Scoboria, A., & Talarico, J. M. (2013). Indirect cueing elicits distinct types of autobiographical

    event representations. *Consciousness and Cognition, 22*, 1495-1509.

Scoboria, A., Wade, K. A., Lindsay, D. S., Azad, T., Strange, D., Ost, J., & Hyman, I. (2017). A

    mega-analysis of memory reports from eight peer-reviewed false memory implantation

    studies. *Memory*, 1-18.

Statista. (2019). Share of adults who visited a museum or gallery in the last year in England from

    2012/13 to 2017/18, by age. Retrieved from

    https://www.statista.com/statistics/418323/museum-galery-attendance-uk-england-by-

    age/

Sheen, M., Kemp, S., & Rubin, D. (2001). Twins dispute memory ownership: A new false

    memory phenomenon. *Memory & Cognition, 26*, 779-788.

Van Bergen, S., Jelicic, M., & Merckelbach, H. L. G. J. (2009). Are subjective memory

   problems related to suggestibility, compliance, false memories, and objective memory

   performance? *The American Journal of Psychology, 122,* 249-257.

Wade, K., & Garry, M. (2005). Strategies for verifying false autobiographical memories. *The

   American Journal of Psychology, 118*, 587-602.

Wade, K. A., Nash, R. A., & Garry, M. (2014). People consider reliability and cost when

   verifying their autobiographical memories. *Acta Psychologica, 146*, 28-34