Maradona in our minds: Memory for the FIFA World Cup reveals common effects between individual and collective memories.

Luz Bavassi ^{a,b,c}, Laura Kaczer ^{a,b}, Rodrigo S. Fernández ^{a,b*}

^a Instituto de Fisiología, Biología Molecular y Neurociencias (IFIByNE)-CONICET

^b Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina

^c Departamento de Física, Universidad de Buenos Aires, Argentina

*: Correspondence concerning this article should be addressed to Rodrigo S. Fernández, IFIByNE (CONICET), Ciudad Universitaria, (1428), Buenos Aires, Argentina. Phone: +5411 4576-3368 (251). Email: rodrigofernandez@fbmc.fcen.uba.ar

Keywords: collective memory, football, forgetting, serial position effect, reminiscence bump

Word count: 4728

Abstract

The FIFA World Cup football (soccer) tournament is one of the most widely watched sporting events in the world. Particularly, the Argentina national football team has appeared in five World Cup finals, winning two of them, and the general support for this team represents a long-standing tradition in this country. In the present study, we asked whether the history of the FIFA World Cup constructs a significant collective memory. Considering that this is an idiosyncratic and informal knowledge, largely affected by emotions, we hypothesized that it constitutes a solid ground for addressing collective memory properties. An online memory task was conducted asking to a large group of Argentine adults ($N=407$) which country was the winner, the runner-up, and the host of each FIFA World Cup tournament that took place since 1930 to 2014. In addition, participants were asked to rank the emotional content and the response confidence of each tournament. Finally, participants reported a number of keywords associated with each World Cup edition, to measure the memory detail. Overall, our results reveal the existence of a robust collective memory for the World Cup, showing a high memory accuracy and detail along the history of the championships. We demonstrated the presence of parallel effects between individual and collective memories, such as a serial-position effect, a modulation by emotion and a reminiscence bump. In addition, we modelled the forgetting curves for different World Cups, revealing that the most memorable ones where could take almost a century to fade from collective memory.

Introduction

Every four years, the daily routine of many people in the world becomes dominated by a single word: football (soccer). The FIFA World Cup is the most important tournament, as well as the most widely viewed and followed sporting event in the world, exceeding even the Olympic Games and the Super Bowl. The cumulative audience for all matches of the 2018 FIFA World Cup was estimated at 3.4 billion viewers, nearly half of the entire population of the planet. This championship has been awarded every four years since the inaugural tournament in 1930 (except in 1942 and 1946 when it was not held because of the World War II). In Argentina, this football passion is even exacerbated and the support for the national football team is a long-standing tradition and part of the national identity (Albareces, 2013). Since its establishment, the Argentina national team has appeared in five FIFA World Cup finals, winning the championship in 1978 and 1986. Furthermore, Diego Maradona and Lionel Messi, two of the greatest football players of all times, are names that are known worldwide. Although more than thirty years have passed since what is considered the 'goal of the Century'¹, a famous goal of Maradona to the English team in the quarter-finals of the 1986 World Cup, most Argentines still know about it. Some people can even recall a famous sportscaster commentary of that goal, describing Maradona as a 'cosmic kite'. Remarkably, this information is not learned at school, or in any formal environment. Thus, this type of shared knowledge lends itself for addressing the properties of collective memory.

Collective memory, sometimes called historical or popular memory, refers to the representation of the past shared by a group. There is an implicit division of labor in the social sciences in which sociologists and anthropologists typically investigate collective phenomena, while psychologists and neuroscientist handle questions pertaining to the minds of individuals (Boyer & Wertsch, 2009; Hirst & Manier, 2008). However, the last few years have witnessed

¹ <https://www.fifa.com/worldcup/matches/round=714/match=392/classic-match/index.htm>

a growing interest amongst psychologists in the way in which people recall their nation's past (Hilton & Liu, 2017; Hirst & Manier, 2008; Roediger & DeSoto, 2014; Roediger III & Abel, 2015; Wertsch, 2002). What do large groups of people remember—and forget? Collective memories establish meanings, relative event importance and rules of remembering within a group, constraining the memorability of public events, highlighting some of them and overshadowing others (Nelson, 2003; Roediger III & Abel, 2015). Notably, collective memories can change over generations. For example, a recent study (Zaromb, Butler, Agarwal, & Roediger, 2014) showed that both younger and older Americans listed the U.S. bombings of Japan as a critical event in World War II. However, older adults rated the bombings quite positively (i.e., the bombs ended the war) whereas younger adults rated the bombings as negative (i.e., the bombs killed and injured thousands of civilians; the war would surely have ended soon anyway). Thus, it is important to bear in mind that apart from being a body of knowledge, collective memory is also a process of continual evolution in understanding between the individual and the group (Dudai, 2002; Hirst, Yamashiro, & Coman, 2018).

Importantly, the building blocks of this shared knowledge are individual memories with their own set of rules and boundaries. A series of recent studies in collective memories (Fu, Xue, DeSoto, & Yuan, 2016; Roediger & DeSoto, 2014; Roediger III & DeSoto, 2016) showed common memory traits typically described in the psychological literature of individual memory, such as the serial position effect, the distinctiveness effect (von Restorff effect), the forgetting function and the false fame effect. For example, the study of Roediger and DeSoto (Roediger & DeSoto, 2014) analyzed presidential-recall tests performed to three generations of undergraduate college students (1974, 1991 and 2009). Americans' recall of the presidents generally followed a classic serial position function (i.e., best recall for the first and the more recent presidents). It demonstrated the potential for the psychological study of the transmission and retention of cultural knowledge based both on exposure and the

mechanisms that shape human memory (Rubin, 2014). However, to be able to generalize and expand the previous findings, it is necessary to address other type of collective memory processes. In this sense, it was shown that collective memories might differ as a function of whether individuals lived through an event (i.e., directly or indirectly experienced it) or learned about it through historical sources (Schuman, Belli, & Bischooping, 1997; Schuman & Rodgers, 2004). Thus, the memories for the World Cup represent a collection of common knowledge, that is shared by many people, whereas it also involved strong autobiographical memories of the editions that were performed after birth.

The Current Research

The present study aimed to investigate the collective memory of Argentines for the FIFA World Cup. Importantly, this type of information is informal and largely affected by emotions (positive and negative). Our general hypothesis is that this knowledge could represent a robust collective memory and might reveal common effects found in individual memories. In particular, we investigated: **1)** the overall knowledge (memory accuracy and detail) for all world cups until 2014 (1930-2014); **2)** their modulation by subjective football value and emotion; and **3)** the role of age and individual memory systems on the forgetting curves. For these purposes, we conducted an online task, asking to a large group of Argentine adults (older than 18 years) which country was the winner, the runner-up, and the host of each FIFA World Cup tournament that took place since 1930 to 2014. In addition, participants were asked to rank the confidence of each response, and the emotional content of each tournament. Finally, participants reported a number of keywords associated with each World Cup edition, to measure the detail and also narrative content of the memory. Thus, we tackled individual memory accuracy and content from a multidimensional approach in order to characterize and understand the persistence of collective memories.

Methods

Participants

A total of 696 Argentinian subjects with age ranging from 18 to 77 (mean age of 29.6 $\pm$ 9.0), were recruited from Facebook, Twitter and email to participate in the current study. Only subjects which completed at least the 75% of the experiment were considered for analysis. The final sample consisted of 407 subjects (218 males and 189 females). **Table 1** shows the demographic profile of the sample.

Procedure

The experiment was conducted in the Socrative (by MasteryConnect; <https://www.socrative.com/>) online platform from October 2016 to November 2017. Subjects were informed that they would complete an online survey about their memories and knowledge of the FIFA World Cups. Since the FIFA World cup was played every 4 years since 1930 (with the exception of 1942 and 1946), this gives a total of 21 official tournaments, but the current study was performed before 2018, thus we only assessed it until 2014. Participants completed the entire survey for each tournament as described in the materials section.

Materials

Valuation. At the beginning of the experiment, subjects were asked to rate their interest in football using a scale from 0 (not interested) to 3 (fanaticism).

Memory accuracy. For each FIFA World Cup, participants were asked the following questions, using a five-choice recognition procedure: 'Which was the host country?' 'Which country was the winner?' 'Which country was the runner-up? The four foils were designed to

be plausible, always including countries that were champions in the previous or following edition. Each correct response summed one point. Memory accuracy was estimated using the percentage of the sum of the three responses per subject per World Cup.

To analyze how Memory accuracy depends on football valuation we performed a one-way ANOVA followed by a Tukey post-hoc test.

Memory detail. Participants were instructed to write down keywords to describe specific details they remembered about each championship (e.g. specific players, goals, etc). Memory detail is defined as the total number of words, excluding articles and numbers. A one-way ANOVA was performed to compare the level of Memory detail according to football valuation followed by a Tukey post-hoc test.

Confidence. Participants were asked to rate the certainty about their responses for each FIFA World Cup, using a 0 to 3 scale.

Emotion. Subjects reported how much they enjoyed or how emotional for them each tournament was, using a scale from 0 to 3.

Linear and nonlinear regressions. To determine the decay of memory for World Cups that occurred prior to birth we performed a linear regression of memory accuracy and detail as a function of the number of championships edition since birth. In order to study the nonlinear curve of forgetting we fitted memory accuracy with an exponential function of two parameters ($y=ae^{bx}$) using a nonlinear least squares method.

Age as modulator of memory. In order to study the relation between participant's performance and age we splitted participants in two groups, older and younger than 30-years-old (based on the median age). We assessed a one-way ANOVA between the two groups for Memory accuracy and detail for the five World Cups where Argentina reached the finals (1930, 1978, 1986, 1990, 2014).

All data was analyzed with MATLAB (Mathworks Inc. Sherborn, MA, USA).

Results

Memory accuracy and detail throughout the history of FIFA World Cups.

Figure 1 shows the results corresponding to memory accuracy (black line) and memory detail (blue line) in a dual-axis chart. Regarding accuracy, results show that the grand average (black dotted line) is almost 60%, three times the random level (black dashed line), revealing an overall high memory precision, and even the lowest values are twice the random choice. Memory detail (blue line) measures the number of keywords per World Cup, showing a grand average of 3 words per response (blue dotted line) and presents a similar dynamic to accuracy, being both measures significantly correlated ($p < 0.0001$; $\rho = 0.8$). As expected, memory accuracy varies throughout the time series, showing peaks of nearly 90% of correct responses in 1978 and 1986, where Argentina won the championship, and in 2014, the closest World Cup edition at the time of our questionnaire. On the other hand, the early tournaments reveal a lower than average accuracy, while the initial 1930 World Cup reveals a higher accuracy than the subsequent points. In this sense, a serial position effect is characterized by an enhancement of the recall of the beginning and end items of a list, called primacy and recency effect, respectively (Roediger & DeSoto, 2014). Another characteristic of the serial position function is that a distinctive event could be well remembered even if it is in the middle of a list. For example, the 1950 World Cup shows a peak in memory detail, which corresponds to the '*Maracanazo*', one of the most memorable events in the history of the World Cup, where the underdog Uruguay defeated the host country Brazil. Thus, our results point to the presence of a primacy and recency effect in the memory of the FIFA World Cup time series, as well as a distinctiveness effect, evidenced by the highest performance in the years corresponding to Argentina winning the championship. However, it might be possible that our results are not a product of the ordinal position but instead are related to how well

Argentina did at each World Cup. Therefore, we performed a correlation between Argentina's final position (indicated in the upper side of Figure 1) and memory performance. Interestingly, memory detail accuracy shows a significant correlation with final position ($p=0.01$; $\rho=-0.6$) while memory accuracy did not reach significance ($p=0.11$; $\rho=-0.4$). That is, the better Argentina performed in the championship, the most vivid episodic detail is found, and vice versa. This result points to the presence of a self-centered (i.e., Argentina-oriented) memory. Thus, we analyzed the correlation between memory accuracy and detail with Brazil's final position. Importantly, Brazil is the most successful national team in the history of the World Cup (won five titles) and the Argentina's derby. Our results show that neither memory accuracy nor memory detail presented a significant correlation with Brazil's final position ($p=0.7$ and $p=0.9$, respectively), thus stressing the idea that participants only have a more vivid memory in the cases where Argentina performed better in the tournament (Rathbone et al., 2008).

In addition, memory detail allows us to address the narrative content of the World Cup memory, as shown in **Supplementary Figure S1** that displays the most mentioned words of detail memory across all tournaments (1930-2014), arranged in size according to the frequency of appearance. As it is evident, the mention to 'Maradona' is the most frequent, followed by 'Argentina', and 'World Cup', 'Brazil'.

Finally, we also measured memory confidence in each World Cup, displayed in **Table 2**. This memory quantification has a similar dynamic as the previous memory measures. Moreover, memory confidence has a significant correlation with memory accuracy ($p<0.0001$; $\rho=0.9$) and with memory detail ($p<0.0001$; $\rho=0.9$). These results are in line with the idea that richer memories (akin to flashbulb memories) are associated with higher response confidence, vividness and detail recollection (Rubin & Talarico, 2017).

Emotion and football valuation as modulators of memory accuracy and detail.

We then asked whether this memory is affected by factors that also shape individual memory. Specifically, we analyzed the influence of emotion and overall football valuation on memory accuracy and detail. **Figure 2** shows the reported emotion per World Cup, and reveals a similar pattern to memory accuracy and detail, with peaks in 1978, 1986 and 2014. In this sense, a significant correlation is found between emotion and memory accuracy ($p < 0.001$; $\rho = 0.8$) and between emotion and memory detail ($p < 0.001$; $\rho = 0.9$). Thus, collective memory shows to be affected by emotional value, as it is usually reported in individual memories (Kensinger, 2009; McGaugh, 2000).

Regarding football valuation (Figure 2B), 55 subjects were not interested at all in football (valuation=0), 122 were a little interested (valuation=1), 117 were 'average' interested (valuation=2) and 108 were very interested (valuation=3). As expected, results show an increase in memory performance according to a higher football valuation, both for accuracy ($F(3, 401) = 42.5$, $p < 0.001$) and memory detail ($F(3, 401) = 7.23$, $p < 0.001$). For memory accuracy, a post-hoc test showed that groups with valuation 2 and 3 were not significantly different from each other, but differ from groups with valuation 0 and 1 (Tukey post-hoc test, $p_{02} < 0.001$, $p_{03} < 0.001$, $p_{12} < 0.001$, $p_{13} < 0.001$), and besides these two groups were significantly different from each other (Tukey post-hoc test, $p_{23} < 0.001$). On the other hand, for memory detail the only group significant different from the others is the one with the highest valuation (in all cases, $p < 0.001$). Thus, memory accuracy is better for subjects that were 'average' or very interested at football while the participants with the highest football valuation reported a greater number keywords.

Memory for World Cups that occurred prior to birth decay linearly, while the ones that occurred during early adulthood are most memorable (reminiscence bump).

We were interested in determining the influence of age at time of the event in the memory accuracy and detail (Rathbone, O'Connor, & Moulin, 2017; Rubin, 1998). Firstly, we compared the memory accuracy and detail for World Cups that occurred prior and after birth (Figure 3). For that purpose, we adjusted each data according to the birthdate of every participant, determining memory performance over eight World Cups before birth and four World Cups after it. Our results show that memory for events prior to birth follow a linear decay function, both for Memory accuracy and memory detail, indicating a forgetting process. On the other hand, no decay is found for the World Cups that occurred after birth. That is, these events were mostly experienced, not learned from an external source, and this implies a more accurate and vivid memory.

From these results, we asked whether there is a difference in the participant's performance according to their age. Thus, we splitted our participants in two groups, based on the median age of the participants (i.e., 30 years-old): older and younger than 30-years-old. **Table 3** shows the results of Memory accuracy and detail for the five World Cups where Argentina reached the finals: 1930, 1978, 1986, 1990, 2014. Our results show that the older group (> 30 years old) has a significantly higher accuracy for the 1978, 1986 and 1990 World Cups. On the other hand, the youngest group has a marginally significant higher memory accuracy and detail for the 2014 World Cup. For most participants in the younger group, the 2014 World Cup coincides with their early adulthood, while the same occurs for the older subjects in the 1986 and 1990 tournaments. Therefore, we suggest that these results might be compatible with a reminiscence bump (Jansari & Parkin, 1996; Rathbone et al., 2017), i.e., the tendency to have increased recollection for events that occurred during adolescence and early adulthood. As expected, event emotionality in both sub-groups had a similar trend as memory accuracy and detail.

Nonlinear forgetting curves differ according to the distinctiveness value of the World Cup.

From previous data we found that overall memory decay linearly when the event was held previous to birth. Now we want to determine the forgetting function of a specific World Cup. Memorability for a specific World Cup can fit a power function in order to estimate the rate at which they will be forgotten (see Roediger & DeSoto, 2014; Wixted, 2004). Thus, we assessed the forgetting curve over time for two different World Cups: 1982 and 1986, using non-linear models of memory decay. We chose these two specific World Cups because they are close in time but their significance is very different: while in 1982 Argentina performed poorly, in 1986 Argentina won the championship with Maradona superb performance. This approach allows us to calculate an estimate of when this information will be forgotten. These forgetting functions are shown in **Figure 4**. It is shown that the 1982 World Cup is fading fastest whereas 1986 presents a slower decay. As suggested by Roediger & De Soto (Roediger & DeSoto, 2014) we can use these data to estimate the number of years that elapse before the memory for each World Cup accuracy fall to the random level (i.e., 20% accuracy). Notably, the 1982 World Cup would take 25 years to reach the random accuracy value, while the 1986 World Cup would take 88 years to fade.

General Discussion.

Collective memories are dynamic representations of a group's past, shared by their members. Thus, their history is elaborated and maintained by social representations, which influences the group's attitudes and behavior (Hirst & Manier, 2008; Nelson, 2003). Common knowledge set the boundaries of remembering for each individual within a group. However, beyond this "extended mind" framework (Hirst et al., 2018), memories can only exist within the individual act of remembering. This top-down perspective, searches for general principles of individual

memory in collective memories. In the current study, using a large sample of Argentinian participants, we investigated their individual memory of the FIFA World Cup (1930-2014) and provided evidence for the existence of a collective memory that shares common attributes with individual and collective memories. Our findings on different common effects between individual and collective memories could be unified as described below:

Common effect #1: Serial position effect. Within different memory systems, items in the first (primacy) and last (recency) positions are better remembered than those items in other positions.

Our results showed that the overall recognition memory (accuracy) was above chance and more accurate for the most recent FIFA tournaments, suggesting a recency effect. In addition, memory for the first World Cup (1930) was higher than the subsequent tournaments, thus suggesting a primacy effect. Similar findings were reported for the knowledge of US presidents and leaders of China (Fu et al., 2016; Roediger & DeSoto, 2014), where the most recent ones revealed a higher memory accuracy, thus showing that subjects within a community recall events in a similar way. In addition, we found that subjects were able to recall specific details for each FIFA tournament edition, but the number of keywords (details) were above the mean for the first and last tournaments, indicating both a primacy and a recency effect, beyond the serial position effect, we found other peaks of recall (corresponding to 1930, 1978, 1986, 1990 and 2014) both in recognition and detail memory, which correlated with Argentina final position (playing or winning the final), supporting the idea that the importance and significance of an event influences its memorability (Rathbone et al., 2017; Rubin & Umanath, 2015). In addition, similar to flashbulb memories, response-

confidence was associated with detail memory (Rubin & Talarico, 2017) but also with memory accuracy, suggesting a vivid and reliable memory.

Finally, as expected, self-centered information (Argentinian position) was better remembered than its rivals (i.e Brazil). These notions lead us to the second common memory effect, which propose that the internal and external context influence memory acquisition and recall.

Common effect #2: Memory modulation. Internal and external factors modulate memory such as elevated levels of emotion or valuation are associated with better subsequent learning and remembering.

Second, we showed that collective memory of the FIFA World Cup is affected by different internal and external factors such as subjects' emotion and general valuation for football. These modulators followed a similar point-by-point trend as memory and was also a correlation between them. In this sense, we found a strong association between the modulators and both recognition and detail memory. In consequence, participants with higher valuations about football and emotional level, had better recognition and detail memory. As predicted, the highest levels of emotion was associated with Argentina playing the finals. Football games are capable of increasing subject's arousal and emotional states to extreme levels. Different reports showed for example, an increment in the number of myocardial infarction, strokes and testosterone levels, during and after a FIFA World Cup match (Carroll, Ebrahim, Tilling, Macleod, & Smith, 2002; van der Meij et al., 2012; Wilbert-Lampen et al., 2008). These results are in line with other reports about memory and football. For example, Morris et. al (Morris, Gruneberg, Sykes, & Merrick, 1981; Morris, Tweedy, & Gruneberg, 1985) showed that football interest predicted subsequent learning of real and imaginary scores. Tinti and colleagues (Tinti, Schmidt, Testa, & Levine, 2014), studied Italians

memory about their championship in 2010 as a form of flashbulb memory. They found that prior football knowledge was associated with a better remembering and two pathways associated with vivid and detailed flashbulb memories: **1)** valuation predicted emotional intensity and posterior rehearsal, and **2)** valuation predicted media exposure and posterior response - confidence. Overall, our results are consistent with the idea that several factors such as emotional value and general interest in football influences memory strength.

Common effect #3: Reminiscence bump and age at time of the event. Experienced events, more specifically between late adolescence and early adulthood, are better remembered than non-experienced events or those occurring in other periods of life.

Third, we revealed that participants' age at the time of each FIFA World Cup was critically associated with accurate remembering, such as experienced events near in time were better recognized than those more distant (Holmes & Conway, 1999). Moreover, subjects were also able to recall more details for experienced than non-experienced events. This memory profile was correlated with a similar one for response-confidence and emotion. Participants were more confident and emotional about those FIFA world Cups, which they experienced. As stated, reminiscence bump is the tendency to remember better events, which occurred between the ages of 15 and 30 years and was demonstrated in different populations and domains (public events, music, etc, Janssen, Chessa, & Murre, 2005; Janssen, Murre, & Meeter, 2008; Rathbone et al., 2017). In order to analyze this effect, we divided our population in two age groups: younger and older than 30 years-old. We found that detail memory, but not recognition memory, was associated with a reminiscence bump. This may suggest that the more episodic and vivid component of memory is more persistent with the passage of time. A similar result was found by Janssen and coworkers (Janssen, Rubin, &

Conway, 2012), which found that preference for football players were those who reached the midpoint of their career when the participants were adolescents. Finally, as expected, we showed that one of the the most memorable FIFA World Cups, such as the 1986 tournament where Argentina won the championship with Maradona leadership, has a slower forgetting curve from collective memory.

Conclusion.

Collective memories develop in the tension between the group and the individual. More than isolated pictures of a shared past, collective memories are stored as interrelated events with their own narratives and schemas, which in turn shapes a group identity (Coman, Brown, Koppel, & Hirst, 2009; Hirst et al., 2018). Importantly, a memory can only be considered collective if it is widely shared and if it helps to define and bind together a group (Brown, Kouri, & Hirst, 2012). Thus, in the present study we demonstrated that memory for the football World Cup represents a robust collective memory that is shaped by several factors, in parallel with autobiographical memory modulation.

Like other types of memory, collective memories are malleable and subject to change (Dudai, Karni, & Born, 2015; Nadel, Hupbach, Gomez, & Newman-Smith, 2012). In this sense, each generation could share a “common core” or theme for collective memories, although the significance attributed to the events may differ across generations (Rathbone et al., 2017; Roediger III & Abel, 2015). In our study, this common theme is Diego Maradona, the most mentioned keyword in memory detail (supplementary Figure S1), and also the organizer of the narrative since 1978 to 2010 tournaments, where he was the coach of the Argentine team. Traditional collective memory studies focused on public events, such as presidents with objective importance to a nation’s past which normally are acquired in classroom settings (i.e. Fu et al., 2016; Roediger & DeSoto, 2014; Zaromb et al., 2014). Here, using a football, we

showed how it forms a robust collective memory, which is only acquired by direct individual experience or media exposure. This suggests that any emotional or significant public event could potentially be transformed in a collective memory and contribute to a group identity.

Summary

All in all, here we showed that the FIFA World Cup constitutes a robust collective memory in a large group of Argentinean subjects, which can be modulated by factors of different nature. Intrinsic features of the event (i.e Argentina final position), individual variables (i.e age at the time of the event), emotional factors (valence), cognitive factors (valuation) and meta-cognitive factors (response-confidence), are essential for overall accuracy and details of a collective memory.

Acknowledgments.

We thank all subjects for their cooperation and María Eugenia Pedreira for helpful criticism. This work was supported by Agencia Nacional de Promoción Científica y Tecnológica (PICT2013-0412). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Table and figure Legends.

Tables

Table 1. Age frequency distribution of our participants.

Age	N
<20	21
20-30	199
30-40	137
40-50	28
>50	50

Table 2. Memory confidence in each FIFA World Cup (mean and standard error).

	Confidence
1930	2.00 (0.06)
1934	0.7 (0.05)
1938	0.5 (0.04)
1950	1.3 (0.07)
1954	0.6 (0.05)
1958	0.7 (0.05)
1962	0.7 (0.05)
1966	1.1 (0.06)
1970	1.0 (0.06)
1974	1.2 (0.06)
1978	2.3 (0.05)
1982	1.1 (0.05)
1986	2.3 (0.05)
1990	2.1 (0.06)
1994	1.7 (0.06)
1998	1.8 (0.06)
2002	1.8 (0.06)
2006	1.8 (0.06)
2010	2.0 (0.06)
2014	2.6 (0.04)

Table 3. Memory accuracy and memory detail for participants younger and older than 30.

	Younger (23.9+ $\pm$ 0.2 years)	Older (37.7+ $\pm$ 0.6 years)	p-value	f
Memory accuracy				
1930	55.0 (2.6)	56.9 (2.6)	0.6	0.3
1978	85.2 (1.8)	93.4 (1.2)	0.0004	12.5
1986	82.7 (1.9)	91.1 (1.5)	0.001	10.5
1990	70.7 (2.5)	88.4 (1.8)	<0.0001	27.4
2014	97.3 (0.9)	94.3 (1.4)	0.08	3.0
Memory detail				
1930	3.9 (0.3)	3.7 (0.3)	0.6	0.2
1978	4.0 (0.5)	4.4 (0.6)	0.8	0.2
1986	3.8 (0.4)	5.8 (1.0)	0.05	3.7
1990	4.0 (0.5)	6.3 (1.4)	0.08	3.0
2014	5.7 (0.6)	4.2 (0.4)	0.05	3.7

Figures

Figure 1. Memory accuracy and detail. Mean value and standard error of memory accuracy (black line) and memory detail (blue line) for each FIFA World Cup. Memory accuracy is the percentage of the sum of the three responses per subject per World Cup. Memory detail is the number the total number of words remembered about each championship per subject. The black dashed line is the random level of memory accuracy (20%). Dot lines represent the grand average of memory measures (accuracy:black and detail:blue). Argentine final position for each tournament is displayed on top of the chart.

Figure 2. Modulators of memory accuracy and detail. A) Mean value and standard error of emotion level reported for each FIFA World Cup. Emotional level is rated between 0 (no emotion) and 3 (high emotion). Argentine final position for each tournament is displayed on top of the chart. B) and C) Memory accuracy and detail regarding football valuation (** one-way ANOVA corrected by Tukey post -hoc test, $p < 0.01$).

Figure 3. Influence of age on Memory of World Cups. Memory accuracy and detail as a number of FIFA World Cup since birth (black dots: mean and standard error). The negative (positive) values of x axis represent championship before (after) birth. Memory accuracy and detail prior to birth were adjusted with a linear function (red line, $y=ax+b$). Both linear regressions present a high goodness coefficient, $R^2= 0.9$. Model coefficients (with 95% confidence bounds) are: memory accuracy: $a=3.9$ (2.9,4.9), $b=82.7$ (77.7,87.8) and memory detail: $a=0.3$ (0.2,0.4), $b=4.2$ (4.0,4.4).

Figure 4. Forgetting curves for 1982 and 1986 FIFA World Cups. Memory accuracy as a function of years elapsed for 1982 edition (light grey dots) and 1986 World Cup (dark grey dots). Forgetting was modelled with a exponential decay using a nonlinear least squares (red line, $y = ae^{bx}$). The coefficients for the nonlinear regression for 1982 (with 95% confidence bounds) are $a=80.1$ (68.3,91.9) and $b=-0.04$ (-0.06, -0.01), the model takes 25 years to cross the random value (20%). The coefficients for the nonlinear regression for 1986 (with 95% confidence bounds) are $a=89.0$ (78.5,99.4) and $b=-0.01$ (-0.03,0.004), the model takes 88 years to cross the random value (20%).

Detail	Freq
MARADONA	583
ARGENTINA	447
FINAL	436
WORLD CUP	432
GOAL	384
FIRST	304
BRAZIL	282
GERMANY	219
ZIDANE	209
PELE	201
PENALTIES	182
MARACANAZO	166
WON	158
HAND	141
MESSI	141
MATCH	133
CHAMPION	130
AGAINST	125
GOD	118
ITALY	116
DIEGO	116

Supplementary Figure S1. Left panel, the schema displays the most mentioned words of detail memory across all tournaments (1930-2014). Word size is arranged according to the frequency of appearance. Right table, the 20 words with higher frequency of appearance.

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