# Age and memory related changes in children's immediate and delayed suggestibility using the Gudjonsson Suggestibility Scale

Gisli Gudjonsson [a,b,*], Monia Vagni [c], Tiziana Maiorano [c], Daniela Pajardi [c]

[a] King's College London, Institute of Psychiatry, Psychology and Neuroscience, London, UK
[b] Reykjavik University, Iceland
[c] Centre for Education and Research in Forensic Psychology, The Department of Humanities, University of Urbino, Italy

## ABSTRACT

The main aim of this study was to investigate age, gender and memory effects on 'immediate' and 'delayed' suggestibility among children, and the relationship between immediate and delayed suggestibility. The participants were 1183 children aged between 7 and 16 years, who had been divided into three age band groups (7–9, 10–12, and 13–16 years). All children completed the Gudjonsson Suggestibility Scale (GSS 2) and a non-verbal IQ test. Delayed suggestibility was measured after a one week delay. There were significant memory and suggestibility effects across the three age groups. Girls had significantly higher immediate and delayed memory scores than boys, but did not differ on suggestibility. Suggestibility predicted age after controlling for immediate recall, indicating significant incremental effects. Immediate and delayed suggestibility were significantly correlated in the two older age groups, but the effect sizes were small. The results suggest that immediate and delayed suggestibility are poorly correlated, and the effects of age and immediate recall are largely confined to immediate suggestibility, indicating that immediate and delayed suggestibility are underpinned by different processes. What they have in common is poor source monitoring (discrepancy detection), but differ in terms of how the interviewee processes the flawed source monitoring over time.

© 2016 Elsevier Ltd. All rights reserved.

## 1. Introduction

Gudjonsson and Clark (1986) define 'interrogative suggestibility' as "the extent to which, within a closed social interaction, people come to accept messages communicated during formal questioning, as the result of which their subsequent behavioural response is affected" (p. 84). This type of suggestibility is relevant to the police interviewing of both child and adult witnesses and suspects and is seen as a potential vulnerability or risk factor when obtaining a reliable account of events (Gudjonsson, 1992, 1997, 2003).

There are two complimentary approaches available for assessing suggestibility, originally referred to as the 'individual differences' and 'experimental' approaches (Schooler & Loftus, 1986). These represent the measurement of 'immediate' and 'delayed' suggestibility, respectively (Ridley & Gudjonsson, 2013). Immediate suggestibility refers to the immediate effects of asking leading questions and applying interrogative pressure and is typically measured by the Gudjonsson Suggestibility Scales (GSS 1 and GSS 2; Gudjonsson, 1984, 1987, 1997). In contrast, delayed suggestibility measures the extent to which the person incorporates misleading post-event information into their subsequent recollection ('misinformation' effects) and follows the experimental paradigm of Loftus, Miller, and Burns (1978). It is typically comprised of a three-stage misinformation paradigm (Chrobak & Zaragoza, 2013; Ridley & Gudjonsson, 2013): (1) witnessing an event, (2) exposure to misleading post-event information, and (3) a delayed test to see if the misleading post-event information presented earlier leads to a suggestible response. Therefore, unlike immediate suggestibility it is measured in a subsequent test to that of the initial suggestion (Chrobak & Zaragoza, 2013; Lee, 2004; Loftus, 1979; Schooler & Loftus, 1986). The central cognitive mechanism that is thought to drive both immediate and delayed suggestibility is faulty 'discrepancy detection' (Gudjonsson, 2003; Schooler & Loftus, 1986), also known as source monitoring errors (Chrobak & Zaragoza, 2013).

Lee (2004) did not find a significant relationship between immediate suggestibility, using the GSS 2, and a separate misinformation paradigm (delayed suggestibility) with children and adolescents (age range 7 to 17 years). In this study, Lee found that age predicted immediate suggestibility, but not delayed suggestibility.

Vagni, Maiorano, Pajardi, and Gudjonsson (2015) measured the relationship between immediate and delayed suggestibility in children (7 to 16 years), using the GSS 2, and found no significant association. Furthermore, unlike immediate suggestibility, delayed suggestibility was not found to be related to either immediate or delayed recall on the GSS 2.

In spite of a similar source monitoring mechanism, the results of these studies suggest that there are some fundamental differences between immediate and delayed suggestibility, probably reflecting different psychological processes (Ridley & Gudjonsson, 2013). Only immediate suggestibility appears to be associated with immediate recall and age. There appears to be little or no relationship between immediate and delayed suggestibility. The studies of Lee (2004) and Vagni et al. (2015) did not investigate gender differences in immediate and delayed suggestibility, but mixed results have been obtained across different studies (Bruck & Melnyk, 2004), mainly suggesting no significant effects.

The main purpose of the present study is to examine these four issues (effects of memory, age and gender on immediate and delayed suggestibility, and the relationship between immediate and delayed suggestibility) in a large study with definitive power. A second aim is to investigate the Cronbach's Alpha Coefficient of immediate suggestibility across three children's age band groups: 7–9, 10–12, and 13–16 years, in case there are age differences in the internal consistency scores. Gignac and Powell (2009) had reported a satisfactory internal consistency for Yield but not for Shift on the GSS 2 among a group of 220 children aged 5.3–13.2 years, but no age effects were tested. Importantly, the use of the GSS 2 for children below the age of 7 has not been recommended (Gudjonsson, 1997) and this may have undermined the results of the study. Danielsdottir, Sigurgeirsdottir, Einarsdottir, and Haraldsson (1993) had found that some of their 6 year old participants had experienced problems with engaging in the GSS 2 task. Therefore, in the current study we have chosen to test children between the age of 7 and 16.

There were four hypotheses:

**Hypothesis 1.** There will be significant age group band effects on the GSS 2 memory and suggestibility scores with younger children having poorer memory and being more suggestible than the older children.

**Hypothesis 2.** Age will predict the GSS 2 suggestibility scores after controlling for IQ and memory (incremental effects).

**Hypothesis 3.** Immediate and delayed suggestibility will be significantly correlated.

**Hypothesis 4.** The Gudjonsson Suggestibility Scales, Yield 1, Yield 2, Shift, and Total Suggestibility, will have satisfactory internal consistency (Cronbach's Alpha Coefficient) among all three age groups.

## 2. Method

### 2.1. Participants

A total of 1183 children and adolescents participated in the study. They had a mean age of 11.3 years (SD = 8.6). There were 615 boys (52%) and 568 girls (48%). For the purpose of the study they were divided into the following three age band groups:

1. 7–9 years ($n = 381$; mean age = 8.09, SD = 0.81; 51% boys, 49% girls).
2. 10–12 years ($n = 360$; mean age = 11.06; SD = 0.87; 54% boys, 46% girls).
3. 13–16 years ($n = 442$; mean age = 14.15; SD = 1.05; 51% boys, 49% girls).

We had ten age groups (7–16 years) and chose to categorise them into the three age bands listed above. We were partly guided by the research of Danielsdottir et al. (1993) and Warren, Hulse-Trotter, and Tubbs (1991), using the Gudjonsson Suggestibility Scales with children in different age groups, but also took the view that three age band groups, the first two spanning three years each, and the last four years, gave a representative picture of children at different stages of development. The advantage of these three age bands is that they provide good norms for children at different ages, which is useful in clinical and forensic practice. It also provided an opportunity of comparing the internal consistency of the suggestibility scores at different age bands, which had never been done before.

Participants were selected randomly from several Italian schools and they came from different geographical areas of Italian regions and social classes. None of the participants had a diagnosis of learning disabilities.

## 3. Instruments

### 3.1. Gudjonsson Suggestibility Scale 2 (GSS 2; Gudjonsson, 1987, 1997, 2013)

The recently published Italian Version of the GSS 2 for children and adolescents (Vagni et al., 2015) was used in the study.

The GSS 2 is comprised of a short story, followed by 20 questions, 15 of which are misleading. It provides a score of immediate and delayed recall, each comprising a maximum of 40 items: Yield 1 (i.e. the number of leading questions to which the participant yields; the maximum score being 15), Yield 2 (i.e. the number of leading questions to which the participant yields after being provided with negative feedback; the maximum score being 15), Shift (the number of questions to which the participant changes the answer after negative feedback, the maximum score being 20), and Total Suggestibility (i.e. the sum of Yield 1 and Shift, the maximum score being 35).

### 3.2. Raven's Matrices (Raven, Court, & Raven, 1998)

The Coloured Progressive Matrices (CPM) and Standard Progressive Matrices (SPM) were used in order to estimate the participants' intellectual abilities. In accordance with the standard instructions, the CPM was used for children up to the age of 12 years and the SPM for children age 12 years and over. The sum of the correct answers was transformed into a percentile value and provides a measure of IQ on the basis of the parameters of the norms of the Italian population.

### 3.3. Procedure

All the children were tested individually. The GSS 2 was administered following standard procedure (Gudjonsson, 1997). The story was read to the participants, who were asked to listen carefully. They were then asked to make an immediate free recall. Delayed recall is typically obtained after 50 min delay, but in the present study it was obtained on a separate session one week later. This allowed a measurement of delayed suggestibility (i.e. the number of misleading suggestions provided during Yield 1 and Yield 2, which had become incorporated into the participant's recall of the story). Raven's Matrices were administered after immediate recall.

### 3.4. Analytical strategy

Means with their standard deviations were provided for continuous descriptive variables. Pearson correlations were performed to investigate the association between delayed suggestibility and the traditional GSS 2 memory and suggestibility scores. Where two groups are compared independent samples t-tests were used and Cohen's d was used to calculate effect sizes. All tests were two-tailed.

Cronbach's Alpha Coefficients were used to measure the internal consistency (reliability) of the suggestibility scales for the three age bands. Coefficients of .70 or above were considered satisfactory, although lower alpha may be acceptable due to the diversity of the personality constructs (Kline, 1999).

One way analysis of variance (ANOVA) was used to measure differences between the three age groups in the GSS 2 scores, including