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An independent academic psychologist, based in England, who has written extensively on different areas of psychology with an emphasis on the critical stance towards traditional ideas.

A complete listing of his writings at http://kmbpsychology.jottit.com.

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1. CREATING FALSE MEMORIES IN EXPERIMENTS

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1.1. INTRODUCTION

The work of Elizabeth Loftus, since the 1970s, on eye-witness memory has shown that recall is easily misled by questioning, and that confidence and accuracy do not necessarily go together. The fallibility of memory is further shown by experiments that implant false memories for minor events.

For example, Braun et al (2002) showed that students exposed to (phoney) Disney advertisements featuring Bugs Bunny later recalled having met Bugs Bunny at Disneyland when they visited as a child. This was clearly a false memory because Bugs Bunny is a Warner Brothers character and would not be at Disneyland (appendix 1A).

More disturbingly, Mazzoni et al (2001) created a false memory among students using suggestion of a childhood experience of nearly choking or witnessing a case of demonic possession (appendix 1B).

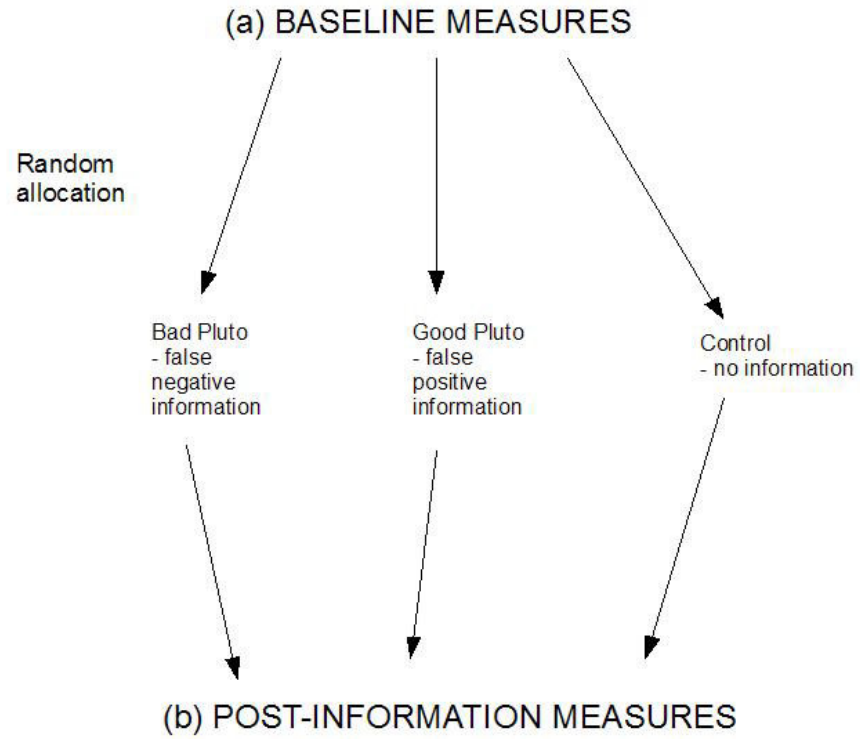
1.2. BERKOWITZ ET AL (2008)

Berkowitz et al (2008) were interested in creating a false childhood memory that went against a positive stereotype because stereotype-consistent information is recalled better than stereotype-inconsistent information. In this experiment, the negative false memory related to a negative experience with the Pluto character at Disneyland (ie: person in Pluto suit).

Three hundred and thirty-two undergraduates at the University of California, Irvine, who had visited Disneyland as a child were randomly allocated to one of three conditions [1]. In condition 1 they were exposed to information that Pluto had licked their ear in an unpleasant manner ("Bad Pluto" condition) (n = 101). In condition 2, the "Good Pluto" condition, the ear-licking

[1] Sixteen participants were removed from the analysis because they could clearly recall a childhood experience of Pluto licking their ear before the experiment began.

was presented as a pleasant experience (n = 105), while the control group had no information about Pluto (n = 110) (figure 1.1).



Predictions - (b) scores will be significantly different to (a) scores:

- Bad Pluto scores will show less liking.
- Good Pluto scores will show more liking.
- Control scores will show no change.
- Bad Pluto and Good Pluto scores will change significantly differently to control scores.

Figure 1.1 - Design of experiment by Berkowitz et al (2008).

Exposure to the false information occurred in the context of a "Disneyland Nostalgia" study of childhood memories. Included in the questionnaires to be completed were a list of events, including "You had your ear licked by Pluto". Participants rated their certainty about the event having happened (from 1, "definitely did not happen", to 8, "definitely did happen"). Participants also rated their liking for Disney characters, and their willingness to pay for stuffed toys of the characters. Participants were told that all the information would be analysed to produce a "personal profile" of memory.

One week later, under the pretext of receiving this "personal profile", the participants were exposed to information about the ear-licking by Pluto in the form of a newspaper report. In the Bad Pluto condition, the

newspaper article "told of a Pluto character who abused hallucinogenic drugs and 'developed a habit of inappropriately licking the ears of many young visitors with his large fabric tongue' in the 1980s and 1990s" (Berkowitz et al 2008 p648). The material in the Good Pluto condition "described a lovable Pluto character who had licked the ears of children, much to the children's delight, from 1984 to 1995" (p648). Subsequently, the participants were questioned about the likelihood of events happening and so on again.

Both experimental groups became significantly more confident between baseline and post-information about having experienced an ear-lick from Pluto. The mean increased from 1.40 to 1.76 in the Bad Pluto condition, and from 1.25 to 2.37 in the Good Pluto condition. The control group showed no significant change (table 1.1). Put another way, 30% of the Bad Pluto and 39% of the Good Pluto participants reported a memory of the event compared to 17% of the control participants. These were called the "seduced" participants. Berkowitz et al felt that "These results suggest that some subjects were seduced by the manipulation and that generally they developed false beliefs that Pluto had licked their ear" (p651).

CONDITION	BASELINE	POST-INFORMATION
Bad Pluto	1.40 (a)	1.76 (a, c)
Good Pluto	1.25 (b)	2.37 (b, c)
Control	1.34	1.44

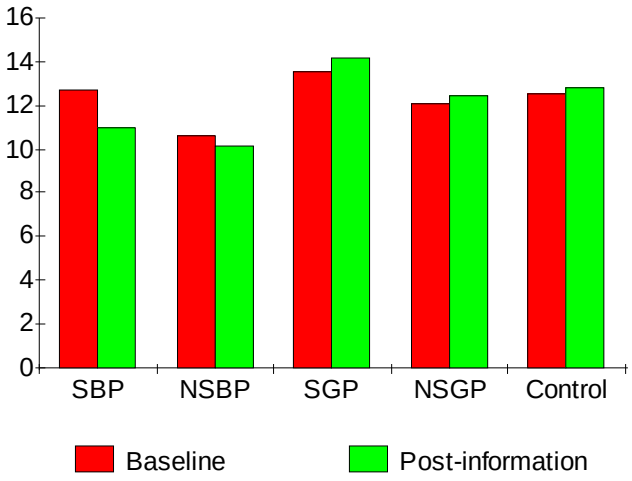
(a), (b) and (c) scores significantly different ($p<0.01$)

Table 1.1 - Mean rating of likelihood of Pluto ear-licking event having happened to them.

Participants in the Bad Pluto condition showed a significant decline in their liking of Pluto from baseline to post-information. The Good Pluto and control conditions showed no such change.

It is one thing to create a false memory of a minor event, but are there consequences to such memories? This was measured by the willingness of participants to pay for a stuffed Pluto toy.

Seduced Bad Pluto participants were willing to pay significantly less and seduced Good Pluto participants to pay more for the toy post-information. In the former case, an average of $12.67 at baseline and $11.00 post-information. In the Good Pluto condition, $13.54 and $14.15 respectively. The non-seduced participants in each condition showed no significant change (figure 1.2).



SBP = seduced Bad Pluto condition
NSBP = non-seduced Bad Pluto condition
SGP = seduced Good Pluto condition
NSGP = non-seduced Good Pluto condition

Figure 1.2 - The mean amount ($) that participants would pay for a stuffed Pluto toy.

Berkowitz et al (2008) concluded: "The primary questions in this experiment were whether it was possible to lead people to falsely believe that they had had an unpleasant social interaction with a Disneyland character when they were children, and if so, whether this belief would have consequences in adulthood. Our results indicate that the answer to the former question is 'yes', but the answer to the latter question is less clear" (p655).

1.3. FALSE MEMORY FOR WORDS

The false memory for individual words is tested experimentally using the Deese-Roediger-McDermott (DRM) paradigm (Deese 1959; Roediger and McDermott 1995). Participants are asked to recall a list of words on the same subject, like cake, pasta, meat, potato and biscuit, but not "food" (lure word). When asked to recall the list, if "food" is remembered then a false memory has been created.

For example, Roediger and McDermott (1995) found an average recall of the lure word of 55% compared to 62% correct recall of words presented, while false recognition was 77% compared to 72% correct recognition. It is important that the word list consists of associates of the non-presented lure word. The false recall of the lure word is a product of how memory stores words in associated categories, and thus can be easily misled.

Using brand names Mantonakis et al (2008) showed the false recall of "Coke" after the presentation of other brands like "Pepsi" and "Sprite", and relevant words like "can" and "drink", but not the false recall of a minor brand, "Dr.Pepper".

More recently, Sherman and Moran (2011) presented ninety-six students at Keele University, England, with eight of sixteen lists of brand names - eg: supermarket names (eg: "Asda") without the non-presented lure word "Tesco". Overall, false free recall was only 5% (with correct recall of words at 36%), but false recognition was higher (half the rate of correct recognition - 45% vs 81%).

1.4. APPENDIX 1A - BRAUN ET AL (2002)

Experiment 1 investigated whether advertising could influence how individuals recalled a childhood event. In this case, a visit to Disney World. One hundred and seven students were asked about twenty childhood events having happened to them, including "Met and shook hands with a favourite TV character at a theme resort", on a scale of 0-100. A week later, participants were given an advertisement to be read and rated. Half received a mock advertisement about Disney World emphasising the opportunity to meet the characters like Mickey Mouse, Goofy and Daffy Duck. The advertisement included certain details, which were to be implanted: "Mickey, the character you've idolised on TV, is only several feet away. Your heart stops but that doesn't stop your hands from sweating. You wipe them off just before reaching up to grab his hand. The excitement rushes through you, you don't know whether you'll faint or explode" (Braun et al 2002 p6).

The control group received an advertisement about an irrelevant product. Afterwards, the participants completed the questionnaire about events having happened to them (under the pretext that the experimenter had had a problem with the previous set).

Significantly more participants who read the Disney advertisement showed an increase in confidence on the "met a TV character" item compared to the control group (90% vs 47%). This showed that the advertisement had influenced the recall. This is known as "imagination inflation" or "advertising inflation" (Braun et al 2002).

Experiment 2 used the same design as Experiment 1 with the aim of seeing if a false memory could be implanted - namely meeting Bugs Bunny at Disneyland. Participants who read the false Disney advertisement including reference to Bugs Bunny, were significantly more likely than the control group to specifically recall shaking hands with Bugs Bunny as a child (16% vs 7% of

participants).

Both experiments showed that "if the ad is part of the reconstruction process, the ad elements or images may be likely to appear as part of consumers' reconstructed memory of their visit, regardless of whether or not the events had actually happened" (Braun et al 2002 p5).

This experiment and this type of research has been criticised in relation to demand characteristics (appendix 1C).

1.5. APPENDIX 1B - MAZZONI ET AL (2001)

One question about this type of research relates to the nature of the false memories. In other words, what information can be implanted? Early studies used relatively unimportant events from childhood, like being lost in a shopping mall at age 3 (Mazzoni et al 1999), spilling punch at a wedding (Hyman et al 1995), and breaking a window with their hand (Garry et al 1996).

It seems that only plausible events can be implanted. For example, Pezdak et al (1997) were able to implant a memory of being lost in 15% of participants, but not the less plausible experience of receiving a rectal enema.

Mazzoni et al (2001) challenged this idea, arguing that apparently implausible events can be (and, in real-life, are) implanted. They proposed a three-step model to explain the process:

i) The event is perceived as plausible by the individual.

ii) The individual must believe that the event could have happened to them.

iii) The individual interprets thoughts and fantasies about the event as memories.

Steps (i) and (ii) can be altered by suggestion as Mazzoni et al (2001) showed with three experiments.

Experiment 1

The aim of this experiment was to show that plausibility for an event can be manipulated. Sixty-five undergraduates at the University of Florence, Italy, were asked to rate the plausibility of individuals like them having experienced forty events, including witnessing a "possession" (implausible event) or almost choking (plausible event). The participants were then divided into three groups for the plausibility manipulation three

months later.

One group of participants read articles which suggested "possession" was quite common in Italian society (Possession group), while another group read about the same thing for almost choking (Choking group). The control group did not read any articles. This was the manipulation of general suggestibility.

One week later, participants received false feedback on a questionnaire about their fears suggesting that they had witnessed a "possession" (Possession group) or almost choked (Choking group) as a child. This was the manipulation of personal suggestibility. A further week later the participants completed the original measures of plausibility for forty events (figure 1.3).

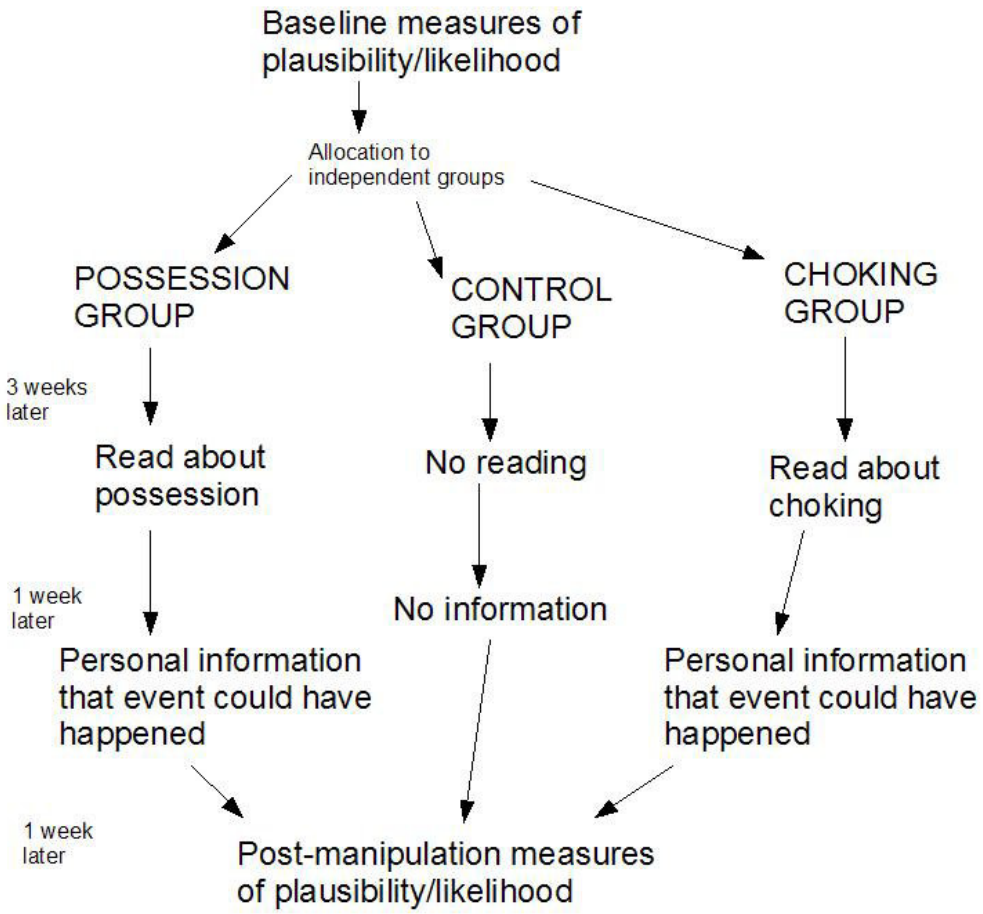
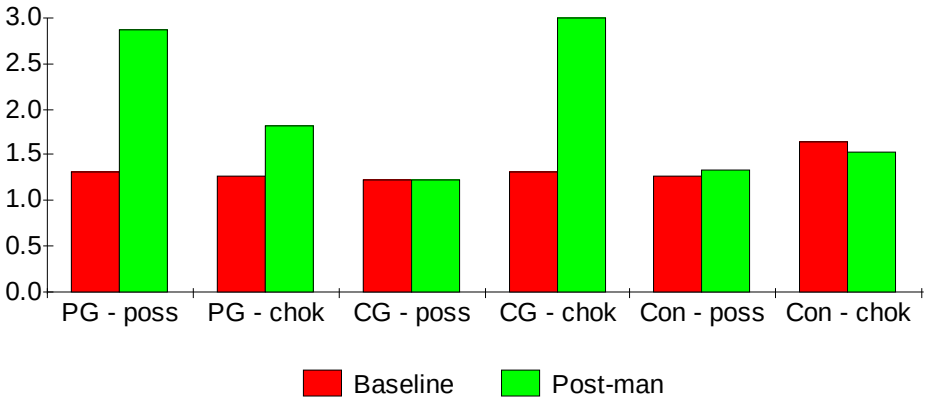


Figure 1.3 - Design of experiment 1 by Mazzoni et al (2001).

Only the ratings of plausibility for having witnessed a "possession" significantly increased in the Possession group between baseline and post-manipulation. But the ratings for the likelihood of having experienced both events significantly increased (figure 1.4). Put



PG - poss = Possession Group possession
PG - chok = Possession Group choking
CG - poss = Choking Group possession
CG - chok = Choking Group choking
Con - poss = Control Group possession
Con - chok = Control Group choking
Post-man = post-manipulation

Figure 1.4 - Mean ratings of likelihood of having experienced an event as a child (out of 8).

another way, 18% of the Possession group and 14% of the Choking group went from saying it did not happen at baseline to saying it probably did happen to them (a score of 5 or more out of 8 on the rating scale) at the end of the experiment (ie: a false memory was implanted).

This experiment showed that implausible memories could be implanted after general and personal suggestion manipulation.

Experiment 2

This experiment focused on the general suggestion manipulation using witnessing a "possession" and another implausible event, a kidnap threat. Three hundred and thirty-two Italian undergraduates were tested using the same procedure as experiment 1 (but without the personal suggestion phase).

Both experimental groups showed significant increases in plausibility and likelihood between baseline and post-manipulation. So reading articles about how common such events were in Italian society had an effect. But no participants in the Possession group and only one in the Kidnap group moved to a score of five or more ("happened") on the rating scales.

Experiment 3

The aim of this experiment was to distinguish

between plausibility and likelihood. This was done by giving the participants articles about the event in Italian society in the past (as compared to another society - Caribbean Islands). It was hypothesised that plausibility ratings would increase, but not likelihood ratings. Fifty-seven undergraduates were involved and only witnessing a "possession" was used.

Both experimental groups showed significant increases in plausibility as predicted, but participants who read about past "possessions" in Italy also showed a significant increase in the likelihood of the event having happened to them. But no participants moved to a score of five or more (ie: successfully implanted memory).

Mazzoni et al (2001) concluded from the three experiments that "Exposing people to a set of articles that describe a relatively implausible phenomenon, like witnessing possession, made people believe that the phenomenon is more plausible, and also made them less confident that they had not experienced the event in childhood" (p57) (table 1.2).

Experiment	Baseline	Post-manipulation	Number of participants	Significance
1	1.32	2.86	65	$p<0.05$
2	1.21	2.08	332	$p<0.001$
3	1.21	2.05	57	$p<0.001$

Table 1.2 - Mean ratings of likelihood of having witnessed a "possession" as a child (out of 8).

This study has a number of ethical concerns.

1. Informed consent and participation.

Details are not given as to whether the undergraduates had volunteered for the studies or that it was part of their course requirements. Furthermore, what did the participants consent to do? That is, they were not given full details of the experiment at the beginning in order to avoid demand characteristics and to allow manipulation.

2. Deception.

The participants were deceived about the real purpose of the experiment as well as by the false information given. They were told that the purpose of the experiment was to "assess the readability and writing

style of various types of passage taken from scientific and non-scientific journals" (Mazzoni et al 2001 pp52-53).

The articles falsely told them that certain events were common in Italian society (table 1.3), and, more importantly, the false feedback on their fear profile. "Participants in the Possession group received false feedback on the responses and were told that their fear profile was a sign that witnessing possession had probably happened to them in early childhood (before age 3). The fear profile of participants in the Choking group was interpreted as a sign that nearly choking had probably happened to them in early childhood" (Mazzoni et al 2001 p53).

- The three articles on possession were no longer than one page each. One article presented the idea that possession is quite common in the general population – especially in the Italian culture – and that witnessing possession is also common. Another article conveyed the idea that many children have witnessed possession. The article included a description of what happens in a typical possession experience (eg: St. Vitus's dance, convulsing, falling down, foaming at the mouth, swearing, vomiting hair, and spontaneous movement of objects), and falsely conveyed the idea that adults will sometimes display symptoms of possession in front of young children under the belief that they can freely do this and the children will not remember later on. The third article contained interviews with adults describing their memories of early childhood, which included witnessing strange behaviours consistent with possession.

(Source: Mazzoni et al 2001 p53)

Table 1.3 - False information given about common occurrence of "possession" in Italy.

3. Debriefing.

Mazzoni et al (2001) described the "thorough" debriefing after experiment 1 (table 1.4).

There is a concern as to whether the participants continued to believe the false information read and been told. How, for them, to distinguish between when the experimenters were telling the truth and not? Just saying that it is the end of the experiment, and what is said now is the truth does not guarantee that participants will not continue to be affected by the earlier false information.

- Participants were told that the aim of the study was to assess conditions under which an implausible event can become more plausible. The goal of the study, they were told, was to assess the role of three factors on the subjective plausibility of an event: (a) information about how common the event is, (b) personal reports by others who have apparently experienced the event, and

(c) false feedback about personality characteristics from the fear profile administered in Phase 3. Participants were also told that a goal of the study was to assess whether changes in perceived plausibility were related to increases in confidence that an event might have been personally experienced and why such a hypothesised relationship might *be* predicted. Participants were invited to contemplate why their own scores might have changed (if they did). They were encouraged to appreciate the potential value in participating in this study, which could make them more aware of possible influences on their own belief systems.

(Source: Mazzoni et al 2001 p53)

Table 1.4 - Details of debriefing by Mazzoni et al (2001).

Other studies have disagreed about false memories for implausible events. For example, Sharman and Scoboria (2009) found that their participants were more confident that they had experienced an implausible event (eg: seeing a ghost), while Pezdek et al (2006) had created only false memories for plausible events.

The conflict in findings may be due to methodological differences including the operational definition of plausibility used (Pezdek and Blandon-Gitlin 2011) [2].

1.6. APPENDIX 1C - DEMAND CHARACTERISTICS AND THE RED HERRING TECHNIQUE

It is a concern that "demand characteristics can make experimental results hard to interpret or actually meaningless" (Laney et al 2008). "Demand characteristics" (Orne 1962) is the name given to the situation where individuals in an experiment behave as "good" participants (or deliberately the opposite) in response to inadvertent cues as to the purpose of the experiment. Whether participants change their behaviour to what is expected by the experimenter or deliberately do the opposite does not matter, the point is that they are not behaving naturally or in their usual way.

Demand characteristics can be a particular problem with deceptive research as the participants are often

[2] Pezdek and Blandon-Gitlin (2011) offered five criticisms of the methodology of Sharman and Scoboria (2009):

- The independent variables were not defined independently of the dependent variables.
- No consistent operationalised definition of plausibility.
- Plausibility was confounded with the events themselves.
- No consistent exclusion criterion for data analysis.
- Erroneous claims made about Pezdek et al (2006).

Sharman and Scoboria (2011) challenged these criticisms..

trying to discern the real purpose of the experiment in order to produce the response demanded. Laney et al (2008) proposed the "Red Herring technique" to deal with demand characteristics: "If normal deception (including providing subjects with a false rationale for the study) is a cross, then the Red Herring technique is a double cross. The Red Herring technique allows naturally curious subjects to "figure out" what the study is about without actually figuring out what the study is about (and thus becoming subject to demand)" (p364).

For example, normal deception in an experiment to implant a false memory of disliking a particular food as a child involves telling the participants that it is an experiment about personality and food preferences. With the Red Herring technique, participants are told same thing, but hints are given throughout the experiment that the "real" purpose is a study of childhood obesity (figure 1.5). Laney et al (2008) pointed out:

> The function of the Red Herring technique is to provide a specific magnet (besides the true purpose of the study) for subjects' suspicions that they are being deceived. Because an experimental subject is a natural problem-solver who "sees it as his task to ascertain the true purpose of the experiment and respond in a manner which will support the hypotheses being tested" (Orne 1962 p779), we provided subjects with a potential solution to the problem that was unrelated to the actual goals of the study. That way, even if subjects did their best to behave like "good" subjects and deliberately provided the answers that they thought we wanted, they ultimately failed because they were providing deliberate answers to the harmless questions that tapped into the Red Herring. An analogous technique was used to great effect by Agatha Christie. She long ago mastered the practice of planting Red Herrings as clues to divert her readers away from the true perpetrator of the crime (p364).

Laney et al (2008) used the Red Herring technique in an experiment to implant a false childhood memory relating to asparagus (either liking or disliking) among 187 undergraduates at the University of California, Irvine, USA. The undergraduates were told that the purpose of the study was "to look for relationships between people' personality and their food preferences". Among the questionnaire they had to complete were items to rate as to the likelihood of having happening to them as a child - either "loved asparagus the first time you tried it" (for the Love group where the aim was to implant a positive memory) or "got sick after eating asparagus" (for the Sick group). For each experimental group, there was a control group.

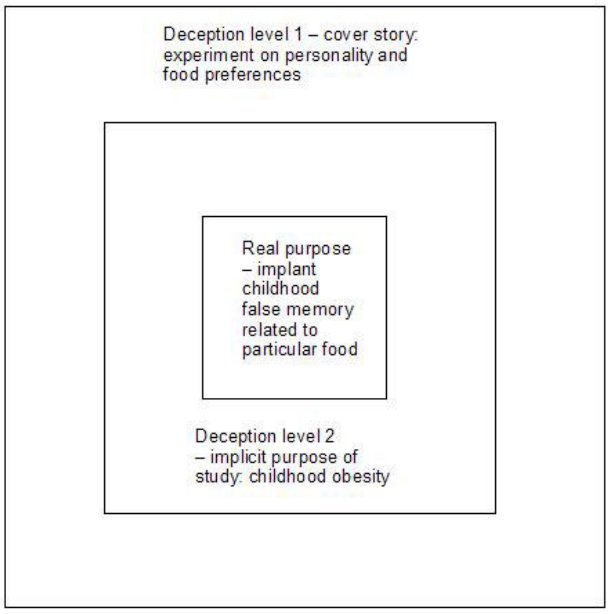


Figure 1.5 - Levels of deception of the Red Herring technique.

Later the participants were given a false personality profile supposedly based on their answers which included information about the food they loved (or hated) as a child. Control participants did not receive this information. Then all the participants completed again the questionnaire on the likelihood of events having happened. This design is standard for the false memory food preferences experiments. However, the Red Herring technique added another layer to the experiment. Throughout the questionnaires were many items about childhood obesity. Finally, the participants were asked to guess the real purpose of the experiment from nine options.

Both experimental groups reported a significant increase in the likelihood of the event having happened (either loving asparagus or getting sick from it) between baseline and post-false personality feedback. This equated to 40% of the Love group and 11% of the Sick group developing a false memory (ie: score of 5 or more out of 7 on likelihood rating).

Overall, 34% of the participants thought the real purpose of the study related to obesity (Red Herring) and only 20% chose "whether there are consequences of false memories". However, participants in the experimental groups were significantly more likely to see the real purpose as studying false memory than the control groups' participants.

Laney et al (2008) felt that the Red Herring technique was an effective way to reduce the risk of demand characteristics where deception was involved in the experiment anyway. but the Red Herring needed to be plausible and relevant to the real purpose of the experiment. For example, Laney et al (2008) tried a Red Herring about gender differences by using different coloured paper for the questionnaires about food preferences completed by men (blue) and women (pink). Participants did not believe that the true purpose of the experiment was related to gender differences.

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2. THREE PRACTICE EXAM QUESTIONS

2.1. Research methods
2.2. Animal behaviour
2.3. GCSE Psychology questions

2.1. RESEARCH METHODS [3]

2.1.1. SECTION A

1. Define the term "independent variable" (2 mks).

2. Fill in the table below on experimental design (15 mks).

Participant design	Description	Advantage	Disadvantage
(a)	Participants randomly divided and perform one condition only	(b)	(c)
Repeated measures	(d)	(e)	(f)
Matching	(g)	(h)	Time consuming

3. Name and describe one type of purposive sampling technique used (3 mks).

4. a) What is a one-tailed hypothesis?
   b) When would you use such a hypothesis?
   c) What is a type 1 error? (5 mks)

TOTAL 25 MKS

2.1.2. SECTION B

1. In what two ways is a "true" experiment different to a quasi-experiment? (4 mks).

2. Describe two strengths of the laboratory experiment compared to a naturalistic observation (5 mks).

3. Describe two weaknesses of the field experiment (4 mks).

[3] The questions are equivalent to 1st year undergraduate level.

4. What is one advantage and one disadvantage of using qualitative methods compared to quantitative ones? (4 mks).

5. Describe the following concepts as applied to research methods:

i) Test-retest reliability
ii) Ecological validity
iii) Inter-observer reliability
iv) Operationalisation (8 mks)

TOTAL 25 MKS

2.1.3. SECTION C Each question is worth 1 mark.

1. Name one measure of central tendency that can be used with nominal data.

2. Which measure of dispersion is defined as "the distance between the top and the bottom value of a set" (Coolican 1990 [4])?

3. Give an example of ordinal data.

4. Which type of data have a fixed zero?

5. Name one advantage of using a parametric test.

6. With what type of data can only non-parametric tests be used?

7. Which statistics test is appropriate to use with two unrelated conditions and ordinal data?

8. In a repeated design two condition experiment with interval data, which non-parametric test would be appropriate?

9. Which statistics test should not be used for nominal data in an unrelated two condition design?

10. Name one of the criteria for using a parametric test.

11. What does a positive correlation tell us about the relationship between two variables?

12. What is a non-parametric equivalent of the Pearson's test?

13. Which parametric test would be used with a related

[4] Coolican, H (1990) Research Methods and Statistics in Psychology London: Hodder & Stoughton.

design of two conditions?

14. Name one situation where X2 can be used.

15. Which statistics test is used with the Friedman test?

16. Name a statistics test that can be used with an unrelated design of three or more conditions.

17. Is the one way ANOVA a parametric or non-parametric test?

18. When is the Yates correction used with X2?

19. In the Binomial sign test, should the calculated value be greater than or less than the critical value to be significant?

20. What is one disadvantage of using the mean as a measure of central tendency?

21. What measure of dispersion is used with a normal distribution?

22. Name one other characteristic of a normal distribution.

23. What is a positively skewed distribution?

24. What does the term "power" mean for a statistics test?

25. What does the phrase "robustness of the t-test" mean?

2.1.4. SUGGESTED ANSWERS

Section A

1. The variable in an experiment that the experimenter deliberately manipulates such that it is different between the experimental and control group.

2. (a) Independent groups design.
(b) Eg: does not require matching of participants beforehand.
(c) Eg: cannot guarantee the similarity of groups.
(d) Each participant performs in all conditions.
(e) Eg: removes individual differences between groups.
(f) Eg: risk of order effects.
(g) Participants are paired (matched) on important characteristics, like age, and then divided into separate conditions.

(h) Eg: removes individual differences to some degree without problem of order effects (2 mks for each question except 1 mk for (a)).

3. Opportunity sample (those available at time); volunteer sample (1 mk for naming and 2 mks for description).

4. (a) A hypothesis that predicts the direction of the results.
(b) When there is plenty of previous research.
(c) This is the rejection of the null hypothesis incorrectly (ie: claim results are significant when not) (1 mk for (a), 2 mks each for (b) and (c)).

Section B

1. Two from randomisation of participants; standardisation of procedure; and control of variables (2 mks for each).

2. Eg: control over participants and environment; ability to change variables to see the effect (2 mks each and 1 mk bonus for detail).

3. Eg: less control than laboratory experiment; usually involves deception (2 mks each).

4. Advantage - eg: more detail than collecting numbers. Disadvantage - eg: subjective (2 mks each).

5. (i) Consistency of a test over time (same individual takes test at two different times and scores correlated).
(ii) Applicability of study and results to real-life settings.
(iii) Agreement between two independent observers of the same behaviour.
(iv) The measurable definition of a concept used in research (eg: "depression" operationalised as score on questionnaire about mood)(2 mks each section).

Section C

1. Mode.
2. Range.
3. Eg: position in sibling birth order (any scale without equal distance between units).
4. Ratio.
5. Eg: more powerful; more sensitive.

6. Nominal; ordinal.
7. Mann Whitney U test; X^2.

8. Wilcoxon signed ranks test; binomial sign test.
9. Any except X^2.
10. Ordinal/ratio data; homogeneity of variance; sample drawn from normally distributed population.

11. Both scoring similar (ie: both high or both low).
12. Spearman's rank correlation coefficient.
13. Related t-test.
14. Test of difference; test of association; "goodness of fit" test.
15. Page's L trend test.

16. Kruskal-Wallis H test; Jonckheere trend test; unrelated ANOVA.
17. Parametric.
18. With sample of less than 25.
19. Less than.
20. Eg: distorted by outliers; cannot be used with nominal or ordinal data.

21. Standard deviation (or z scores).
22. Eg: all 3 measures of central tendency are same.
23. Mean is higher than mode.
24. Efficiency at rejecting null hypothesis at a particular significant level.
25. Not affected by failure to keep parametric conditions.

2.2. ANIMAL BEHAVIOUR [5]

A. Ideal group size for prairie voles

Prairie voles (Microtus ochrogaster) live in groups in underground nests in North America. The size of the group varies, particularly in the number of adults in the group. Group living has both advantages and disadvantages for animals, and usually exists because the costs exceed the benefits. There will be an optimum group size, where the fitness of members of that group will exceed those living in smaller or larger groups.

A recent study * set out to discover the optimum size of the group for the prairie vole. The researchers had two measures of fitness: number of surviving young at 12 days old (when they first emerge from the underground nest), and 30 days old (age at which prairie voles reach reproductive maturity). The study used fields near to the University of Illinois where the population of voles has been studied for over twenty years. The field was divided into grids. This is an example of a "semi-natural lab".

* McGuire, B; Getz, L.L and Oli, M.T (2002) Fitness consequences of sociality in prairie voles, Microtus ochrogaster: influence of group size and composition, Animal Behaviour, 64, 645-654

[5] Equivalent to A Level in England and Wales (18 years old; pre-degree level).

QUESTIONS

A.1. The study took place in a "semi-natural lab". Suggest one advantage and one disadvantage of this method over a fully naturalistic observation in the wild (2 marks).

A.2. The researchers set traps to capture the prairie voles at three different distances to the nests.

a) Why did the researchers need to capture the voles? (1 mark).

b) Why did the researchers set the traps at three different places in relation to the nests? (1 mark).

A.3. The study began in 1980, and the researchers tagged each vole with a unique toe-clip. This was different coloured clips on a maximum of two toes per foot. This method of tagging is now believed to be unethical. Suggest one reason why this is the case (1 mark).

A.4. The researchers used a total of 647 groups for their results, but eight groups were excluded from analysis as outliers. What are outliers, and why did the researchers exclude them from the analysis? (2 marks).

A.5. The mean number of adults found in each group was 2.11 (+/- 0.05). Why does "+/- 0.05" signify? (1 mark).

A.6. Suggest one advantage and one disadvantage of group living for animals (2 marks).

TOTAL: 10 marks

SUGGESTED ANSWERS

A.1. Advantage - eg: easier to measure and record population (1 mark).
Disadvantage - eg: not completely in own environment (ie: influence of being continuously studied) (1 mark).

A.2. a) Capture allows accurate counting of the study population, particularly the number of adults and juveniles (1 mark).
b) Three different places in order to capture the whole population, and any voles that avoided one trap (1 mark).

A.3. Permanent mark on animal, and tags may effect the use of their toes; other methods, like electronic identification, are now more commonly used (1 mark for either).

A.4. Outliers are extremely high or low scores relative to the mean (1 mark); their inclusion could distort the mean for the group (1 mark).

A.5. Standard deviation of 0.05 (1 mark).

A.6. Advantages include enhanced care of young; enhanced thermoregulation; improved ability to detect/defend against predators; improved ability to exploit resources (1 mark for any one).

Disadvantages include conspicuous to predators; increased competition for mates/food; transmission of disease; suppressed reproduction (1 mark for any one).

B. Anti-predator responses of aphids to parasites based on food deprivation.

Aphids are tiny insects, less than 5mm long, that infest certain plants. In particular, the pea aphid (Acyrthosiphon pisum (Harris)) is one of the largest of the species, and infests legumes mainly. Pea aphids are at risk from parasites that lay eggs within the host (eg Aphidius ervi). The eggs take two weeks to grow and then emerge from the dead host.

Aphids have a number of anti-predator behaviours to avoid parasitism. These include walking away from a feeding site infested by parasites, dropping off the plant to avoid exposure, and shaking the body vigorously while kicking with the hind legs at the parasitoid. Each of these strategies, though, uses a different amount of energy.

A recent study * wanted to find out if the anti-predator strategy chosen was influenced by food deprivation. In a lab experiment, pea aphids were deprived of food for 24 or 48 hours, along with a control group of no food deprivation. Then their behaviour was observed on leaves with the parasitoid present. The episodes were videotaped, and stopped three minutes after first contact between the aphid and the parasitoid. The experiment was replicated fourteen times.

* Villagra, C.A; Ramirez, C.C and Niemayer, H.M (2002) Anti-predator responses of aphids to parasitoids change as a function of aphid physiological state, Animal Behaviour, 64, 677-683.

QUESTIONS

B.1. Suggest one advantage in the use of a laboratory experiment in this research (1 mark).

B.2. Why is it necessary to have a control group with no food deprivation in this experiment? (1 mark).

B.3. Why did the researchers replicate the experiment fourteen times? (1 mark).

B.4. Why did the researchers stop the experiment three

minutes after contact between the aphid and the parasitoid? (1 mark).

B.5. The means from the three conditions showed significant differences ($p<0.05$). What does $p<0.05$ mean? (2 marks).

B.6. The researchers found various probability levels for different aspects of the experiment. In the table below, what behaviours would be viewed as having significant differences in psychology? (2 marks).

BEHAVIOUR	PROBABILITY LEVEL
Walking away time	0.014
Non-feeding time	0.024
Feeding time	0.0001
Number of kicks	0.573
Number of droppings	0.011

TOTAL: 8 marks

SUGGESTED ANSWERS

B.1. Control of the conditions of food deprivation 91 mark).

B.2. To give a baseline for the behaviour, and as a means of comparison with the two experimental conditions (1 mark for either).

B.3. To check that the results were typical of the aphid's behaviour, and to give a larger sample of data (1 mark for either).

B.4. This was long enough to record the anti-predator strategy used, and it provided a standardised aspect of the experiment (1 mark for either).

B.5. The likelihood of the results being due to chance is 5 in 100 (or 1 in 20) or less (2 marks).

B.6. Only "number of kicks" not significant because all others below $p<0.05$ OR naming two correct (2 marks).

2.3. GCSE PSYCHOLOGY QUESTIONS

2.3.1. SECTION A - COGNITIVE PSYCHOLOGY

QUESTION 1 - TOTAL FOR THIS QUESTION: 30 MARKS

As part of their GCSE coursework, a student has planned an experiment using a repeated measures design. The aim of the study was to see if participants would perceive an ambiguous figure differently depending on the previous items viewed - either a list of numbers (condition A) or a list of letters (condition B).

a) For this experiment state both the independent variable and the dependent variable (2 marks).

b) The student used counterbalancing of the participants in the experiment. What is counterbalancing in this experiment? (2 mks).

c) The experiment used the repeated measures design. Explain a disadvantage of this design for this experiment. What is another design that the student could have used? (3 mks).

d) Read the article below and answer the questions that follow.

Television Violence and Children

A recent study has found that children in the USA who watched more violence on television before ten years old were more aggressive in their personal relationships in their early twenties. The researcher said that a very high positive correlation was found.

i) Explain what is meant by the term "positive correlation" in the article above (3 mks).

ii) Use psychological evidence to discuss how watching violence on television can cause children to be more aggressive (4 mks).

e) Bob does not do well in examinations at school because he cannot remember anything he learnt the night before while revising. Describe one psychological explanation of forgetting. Explain how to overcome that type of forgetting (5 mks).

f) Extinction Behaviour shaping
Spontaneous recovery Negative reinforcement

Choose two of the above terms and define them. Write a brief description of the two factors you have chosen in

learning studies with children (4 mks).

g) Psychologists have studied memory for facts over many years. Use your knowledge of psychological research to discuss two explanations of memory (7 mks).

TOTAL: 30 MARKS

2.3.2. SECTION B - SOCIAL PSYCHOLOGY

QUESTION 2 - TOTAL FOR THIS QUESTION: 30 MARKS

An experiment was conducted in which participants had to make fifteen different snooker shots. There were two experimental conditions: (a) making the shots in front of the experimenter only, and (b) making the shots in front of an audience of twenty people. The participants were either regular snooker players or had rarely played. The number of successful shots completed were measured for all the participants. The results of the experiment are shown in Table 1 below:

TYPE OF SNOOKER PLAYER	IN FRONT OF EXPERIMENTER ONLY	IN FRONT OF AUDIENCE
REGULAR PLAYER	9.2	13.1
PLAYS RARELY	6.1	4.4

Table 1. Mean number of successful snooker shots (out of 15) by participants.

a) Describe the results of the experiment (2 mks).

b) Identify the experimental design chosen for this experiment and explain one advantage of choosing the design you have identified (3 mks).

c) Because the ability of the snooker players was important to the experiment, random sampling could not be used. What is random sampling? What alternative sampling technique could be used? (2 mks).

d) Use your knowledge of psychology to explain the results of this experiment (2 mks).

e) Discuss one limitation of the experiment described above (2 mks).

f) Distinguish between the terms "prejudice" and "discrimination" as they are used in psychology (3 mks).

g) Psychologists have been interested in studying how

individuals form impressions of other people. Name two factors which have been shown to affect this process and use psychological evidence to support your answer (8 mks).

h) Describe one study in which social influence was investigated. Indicate in your answer the method used, the results obtained and the conclusion drawn (5 mks).

i) Use your knowledge of psychology to discuss the likely success of attempts to influence conformity in real-life situations (3 mks).

TOTAL: 30 MARKS

2.3.3. SECTION C - DEVELOPMENTAL PSYCHOLOGY

QUESTION 3 - TOTAL FOR THIS QUESTION: 30 MARKS

As part of their GCSE coursework, two psychology students wanted to look at the possible differences in egocentric thought of five year olds living in two different areas of Scotland.

- Firstly, they visited a class of five year olds living in a city in a mainly flat area.

- Secondly, they visited a class of five year olds living in a mountainous area.

- There were 30 children in each class.

- The students worked with the children one at a time.

- They used the "three mountains task" as developed by Jean Piaget.

Each child was asked what the doll sitting opposite to the child could see on the mountains. The child who reported their own viewpoint were recorded as having egocentric thought. The results are given in Table 2 below:

WHERE CHILDREN LIVED	EGOCENTRIC	NOT EGOCENTRIC
IN CITY	28	2
IN MOUNTAINS	15	15

Table 2. The number of the children in the "three mountains task" based on their responses.

a) Write a suitable hypothesis for this study (2 mks).

b) Explain one conclusion which can be drawn from the results of this study (4 mks).

c) Use your knowledge of psychology to discuss research into egocentric thought in young children (10 mks).

d) What do psychologists mean by the terms "sex identity" and "gender identity"? With reference to the psychoanalytic approach, discuss how gender identity develops (8 mks).

e) Discuss Bowlby's work relating to maternal deprivation (6 mks).

TOTAL: 30 MARKS

2.3.4. SECTION D - PRO AND ANTI-SOCIAL BEHAVIOUR

QUESTION 4 - TOTAL FOR THIS QUESTION: 30 MARKS

a) Distinguish between the Behaviourist and Cognitive approaches to moral development (3 mks).

b) Describe and evaluate one study conducted by a Cognitive Psychologist to investigate moral behaviour. Indicate in your answer the method used, the results obtained and the conclusion drawn (6 mks).

c) A study was conducted in which a man collapsed on a New York subway train between two particular stations. There were two conditions in this study:

Condition A - The man who collapsed was carrying a white stick.
Condition B - The man's clothes smelt of alcohol.

None of the people on the subway train knew this was a study and not real. Two observers recorded how many people moved to help the collapsed man within three minutes. The results of the study are shown in Table 3 below:

CONDITION A	90
CONDITION B	49

Table 3. Percentage of participants who helped the collapsed man.

i) Use your knowledge of psychology to explain the results of the experiment (3 mks).

ii) What type of research method was used in this study? Explain why you have given your answer (3 mks).

iii) This type of study has ethical issues. Discuss two ethical issues of this particular study (5 mks).

d) There are four major approaches which attempt to explain aggressive behaviour in humans. From the list below choose two approaches and explain how they are distinct from each other.

- Ethological approach
- Biological approach
- Psychodynamic approach
- Social Learning approach (4 mks).

e) Use your knowledge of psychology to discuss the likely success of attempts to improve pro-social behaviour (6 mks).

TOTAL: 30 MARKS

2.3.5. MARKING SCHEME

SECTION A - COGNITIVE PSYCHOLOGY

a) 1 mk = IV: type of previous list (ie: words or letters)
1 mk = DV: how ambiguous figure perceived

b) 1 mk = definition of counterbalancing
1 mk = application to stem

c) 1-2 mks = disadvantage - eg: participants knew purpose of experiment by second condition
1 mk = correctly named alternative

d)(i) 1 mk = definition of correlation
1 mk = positive correlation
1 mk = applied to stem

d)(ii) 2-1 mks = brief details of SLT
4-3 mks = Bandura's research

e) 1-3 mks = details of explanation
1-2 mks = explanation of how to overcome; eg: cue dependent forgetting by use of mnemonics to aid cue retrieval

f) 1 mk = correct definition (x2)
1 mk = term in action with children (x2)

g) 2-1 mks = muddled or partial accurate description
4-3 mks = one explanation in detail or two with minimal reference to research
7-5 mks = two explanations and reference to supporting evidence

SECTION B - SOCIAL PSYCHOLOGY

a) 1 mk = performance of good players improves with the presence of an audience
1 mk = performance of poor players declines with audience

b) 1 mk = independent groups design
1-2 mks = general advantage

c) 1 mk = defining random sampling
1 mk = alternative sampling technique eg volunteers

d) 1-2 mks = audience effect: increased performance for well-learnt tasks and decline for poorly learnt one in front of audience

e) 1-2 mks = details of this study - eg: regularity of play does not mean skilled; presence of experimenter in condition A is audience

f) 2-1 mks = defines one correctly or accuracy of two definitions vague
3 mks = both clearly defined

g) 1-2 mks = description of factor (x2) eg: primacy/recency; central traits; implicit personality theories
1-2 mks = evidence (x2)

h) 1-2 mks = method
1-2 mks = results
1 mk = conclusion
No mark for just naming or other not relevant information

i) 1-3 mks = level of detail - eg: importance of group to individual; whether situation one-off or not

SECTION C - DEVELOPMENTAL PSYCHOLOGY

a) 1-2 mks = clarity of hypothesis
Hypothesis or null; one or two-tailed acceptable - eg: There will be a difference in the level of egocentric thought shown by five year olds as measured on the "three mountains task" depending where they live

b) 1-4 mks = details of answer - eg: relevance of task influences findings; reference to "policeman/boy doll"

c) 3-1 mks = muddled or brief; max 2 mks if repeat stem
7-4 mks = attempt at explanation; max 6 mks if one study only used

10-8 mks = good definition of egocentrism; good detail of research

d) 1-2 mks = accuracy of definitions
1-6 mks = accuracy of details about theory

e) 3-1 mks = muddled or brief
6-4 mks = clarity in description

SECTION D - PRO AND ANTI-SOCIAL BEHAVIOUR

a) 2-1 mks = one approach clearly explained only or both briefly presented
3 mks = both terms with clarity

b) 1-2 mks = method
1-2 mks = results
1 mk = conclusion
1 mk = bonus for clarity of detail

c) (i) 1-3 mks = details of explanation - eg: appearance of victim influences level of bystander intervention

c) (ii) 1 mk = field experiment
1-2 mks = because has IV/DV; control of variables

c) (iii) 1-2 mks = details of ethical issue (x2)
1 mk = bonus for level of detail - eg: deception; distress to passengers; must be specific to that study

d) 1-2 mks = details of approach (x2); must be related to human aggression

e) 1-6 mks = details; eg: socialisation of children; factors that encourage bystander intervention