

# Manipulating the Human Memory for Fun and Profit

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# Über Mich



## Definition (Outrage as a Svc @OaaSvc)

Science is awesome. You aren't doing science in infosec. Why not? Seems to be the overriding message of @0xKaishakunin #AusCERT2014



# Misha Defonseca

- born Monique de Wael; 12 May 1937 in Etterbeek
- published her memoirs in 1997
- *Misha: A Mémoire of the Holocaust Years*
- wandered through Europe from Belgium to Ukraine as an 8 year old
- not the only case of made up memories



# Stand Back!



# False Memories

- Kraepelin, E. (1887). Ueber Erinnerungsfälschungen. *European Archives of Psychiatry and Clinical Neuroscience*, 18(1), 199–239: memory falsification (Erinnerungsverfälschung, Erinnerungsfälschung)
- Cognition and Recollection are neuronal processes
- which can be corrupted/falsified
- researched since 1960s
- experiments have shown that memories can be manipulated or even completely falsified
- corruption can occur spontaneously or triggered by a suggestion, hypnosis, stress or exhaustion
- has to be excluded from pathological delusion



# False Memories

suggested false memories gain plausibility:

- the more frequently they are suggested
- the more consistent they are
- the more frequently the subject visualised the false memory
- the more emotionally they are

The resulting *false* memories are rich in detail, emotional and very credible  
cf: Ceci and Loftus (1994), Kaplan, Van Damme, Levine, and Loftus (2016)

# False Memories

- emotional stimuli have a higher impact than neutral ones
- Cortisol release strengthen the memory of emotional stimuli
- those memories are recalled more often
- depending on the mood (cf bipolar disorder)
- this affects memories and memory falsification
- does not matter if positive oder negative emotions



# False Memories

- negative emotions lead to focussing
- mugging: focus on gun, because the gun is dangerous  $\rightsquigarrow$  tunnel memory
- positive emotions to widening
- subject tries to memorise as much as possible, richness in details suffers
- eye witnesses can very easily be manipulated by examinations or media reports

cf: Safer, Christianson, Autry, and Österlund (1998), Frenda, Nichols, and Loftus (2011)

# False Memories

## Lost in the mall experiment

- tried to implant completely new fake memory into 24 subjects
- subjects were asked to recall 3 events from childhood
- 2 events were described by close relatives to the researchers, one event was made up
- made up event: at age 4-6 the subject got lost in a mall and was returned to the family by a helpful stranger
- relatives provided details like names of a mall and shops, names of family members etc.
- 68% (49/72) of the events were recalled correctly, 6 subjects recalled the made up event
- clarity ratings and number of subjects rose in a repeated interview and 5 subjects considered a real event to be the made up

cf: Loftus and Pickrell (1995), M. Wallach and Wallach (1983), Loftus (1997)



# False Memories

## Bugs Bunny in Disneyland

- created false memory of meeting Bugs Bunny in Disneyland
- Bugs Bunny is Warner Bros. and prohibited from entering Disneyland
- 16% falsely recollected meeting Bugs Bunny there, 35% in a follow-up study

cf: Loftus (2003), R. J. Sternberg and Sternberg (2016)

- being in a mall and getting lost there is quite common for a child
- same experiment with another false memory: getting sick and spending a night in the hospital
- same result: 20% (4/20) results recalled false memory

cf: Hyman, Husband, and Billings (1995)



# Priming

- subliminal advertising
- James Vicary: Eat Popcorn, Drink Coca Cola
- experiment was made up, bad design, technical impossible
- modern studies show subliminal messages effects – but only in labs



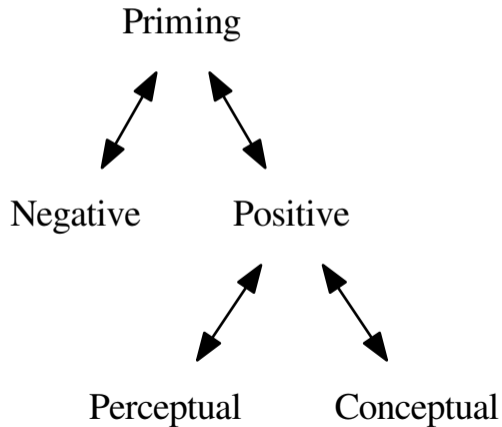
# Priming

- implicit memory effect in which exposure to one stimulus influences the response to another stimulus
- people were faster in deciding that a string of letters is a word when the word followed an associatively or semantically related word
- Priming can occur following perceptual, semantic, or conceptual stimulus repetition
- Unconscious priming effects can affect word choice on a word-stem completion test long after the words have been consciously forgotten

cf: Meyer and Schvaneveldt (1971), R. Schvaneveldt and Meyer (1973), Meyer and Schvaneveldt (1975), Tulving, Schacter, and Stark (1982), Zurif (1995)



# Priming



# Priming

- Williams and Bargh (2008): something as simple as holding a hot or cold beverage before an interview could result in pleasant or negative opinion of the interviewer
- Yong (no date): study above cannot be replicated



# Theory of Mind

- ability to attribute mental states to oneself and others
- related to the concept of empathy
- can be impaired by alcohol, cocaine, ADS, schizophrenia and ASD
- cf. Kanner, Asperger, Frith, Baron Cohen





# Suggestive Questions

- implies that a certain answer should be given in response
- falsely presents a presupposition in the question as accepted fact
- can create confabulation in eyewitnesses Loftus and Palmer (1974)

# A good measurement

- **Reliability:** the overall consistency of a measure; measurement produces similar results under consistent conditions
- **Objectivity:** the standard of a research study such that its hypotheses, choices of variables analyzes, gauges made, methods of control, and observations are lacking bias as much as is possible
- **Validity:** Construct V. the magnitude to which an analysis or tool is able to gauge an abstract characteristic, capacity, or construct.
- *Replicability:* a study should produce the same results if repeated exactly (no one is doing it because you don't get money and fame for it)

# Phrenology



# NLP

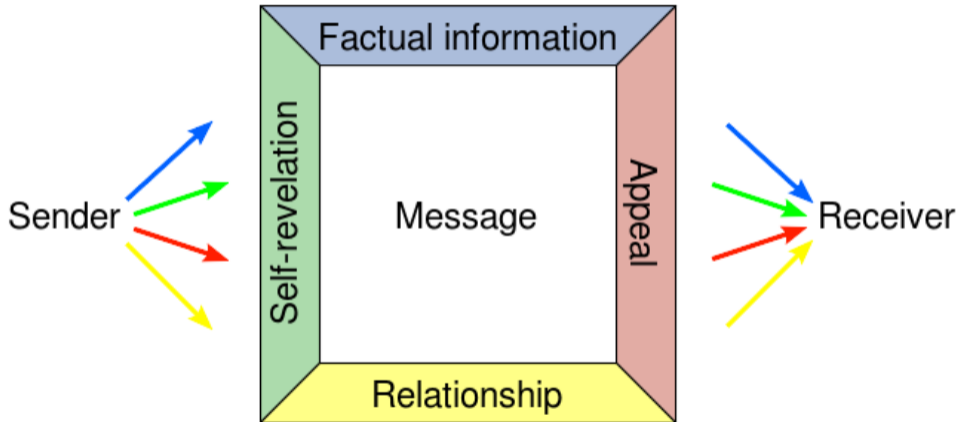
## Neuro-Linguistic Programming

- Pseudoscience, neither Neuro nor Linguistic
- aggressive marketing
- Homeopathy of Psychology
- eye movement theory could not be replicated – multiple times
- failed the 1st stage of scientific evaluation of the German health system





# Friedemann Schulz von Thun



# Friedemann Schulz von Thun

- facts** matter of fact like data and facts, which are part of the news
- self-revealing** conscious or not intended - tells something about himself, his motives, values, emotions etc.
- relationship** how the sender gets along with the receiver and what he thinks of him.
- appeal** contains the desire, advice, instruction and effects that the speaker is seeking for

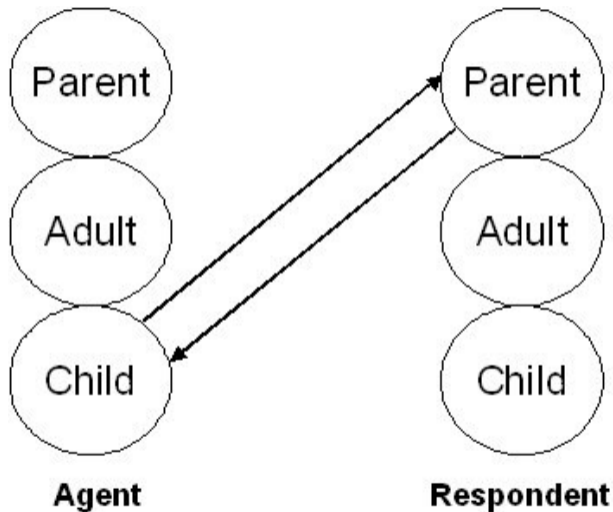
# Transactional Analysis (TA)

- Eric Berne: Games People Play: The Psychology of Human Relationships
- Theory of personality AND communication
- Thomas Harris: I am OK, You are OK





## Transactional Analysis (ta)



# Conclusion

- memories can be manipulated, false memories can be implanted
- try to show pictures
- hit on emotions
- repeat the attacks
- make the victim visualise the false memory as often as possible
- use suggestive questions



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