

Freeze-Fight-Flight mechanisms in violent offenders

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Based on the literature study (encompassing literature on FFFFF, case descriptions of lone wolves, and literature regarding different forms of aggression) specific hypotheses with regard to the role of freeze-fight-flight and focus (FFFF) in violent...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Personality disorders and disturbances in behaviour
Study type	Observational non invasive

Summary

ID

NL-OMON37497

Source

ToetsingOnline

Brief title

FFF in violent offenders

Condition

- Personality disorders and disturbances in behaviour

Synonym

aggression, violence

Research involving

Human

Sponsors and support

Primary sponsor: Wetenschappelijk Onderzoeks- en Documentatie Centrum, Ministerie van justitie en veiligheid

Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: aggression, fight, flight, freeze

Outcome measures

Primary outcome

Primary study parameters on the three experimental tasks:

- reaction times
- number of errors
- movement parameters

This will be examined in relation to the following possible factors

movement (approach, avoid), valence (happy, angry, neutral), instrumental context (happy, angry)

Secondary outcome

scores on questionnaires, heartbeat, hormonal levels

Study description

Background summary

The most common reaction that animals and humans show when being exposed to a threatening situation is the freeze-fight-flight (FFF) response (Blanchard et al., 2011). In different forms of psychopathology, including psychopathy, a disbalance in this FFF system is suspected (Roelofs, et al., 2009; Heuer et al., 2007, von Borries et al., under revision). A literature study on violent attacks by lone wolves (assignment by the WODC) has shown that a difference between reactive and instrumental aggression is crucial. For these two types of aggression, specific hypotheses were formed on the basis of literature, with respect to the different components of the FFF system. However, these hypotheses are based on analogue evidence and theoretical models. It is of importance to test these hypotheses experimentally, in order to objectively quantify the FFF sequence in violent offenders. Furthermore, it is important to

understand the roles of two hormones related to FFF, cortisol and testosterone. It is known that these hormones influence fight and flight behavior in healthy people (Volman et al., 2011) and that they are related to aggression (van Honk et al., 2007)

Study objective

Based on the literature study (encompassing literature on FFFF, case descriptions of lone wolves, and literature regarding different forms of aggression) specific hypotheses with regard to the role of freeze-fight-flight and focus (FFFF) in violent offender types (instrumental versus reactive aggressive) have been formed. Objective of the proposed study is to experimentally test these hypothesis by means of an innovative experimental setup that allows us to measure these FFFF responses in humans and relate them to different forms of aggression.

Study design

Balance board

A balance board consists of a set of finely calibrated scales, measuring mechanical forces. The pattern of forces can be used to derive body position with at a high spatial (1M with a sub-millimeter) and temporal resolution 100 Hz. The platform records reliably over four vertical forces. The pressure sensors derive directly from the wii balance board. Each sensor has a maximum pressure of 120Kg. In-house electronics is build to get a clean amplification from the sensors. A National instruments card, USB-6221, takes care of the A/D conversion and connects with usb to a pc.

Task 1

Affective approach-avoidance learning task

The goal of this learning task is to investigate the emotional influence on instrumental approach avoidance. To disentangle the emotional responses from the instrumental responses, these two are separated in time and space. The learning task consists of one approach and one avoidance block. The task is framed in terms of a gems collecting and sorting task. At the beginning of each trial, an emotional face (angry or happy) is shown on the screen preceding the instrumental stimulus. Instrumental stimuli (gems) are colored shapes. In each block, there are 6 instrumental stimuli types. In the approach block, instrumental stimuli (gems 1-6) are presented to one side of the screen surrounded by a white frame. Good gems (gems 1-3) are to be collected, whereas bad gems (gems 4-6) are not to be collected. Participants are instructed to indicate that they want to collect the gem by making a step from the middle of the balance board to the side where the gem is presented (approach-go). They could also decide not to collect the gem by remaining in the middle of the balance board for 2.5 seconds (approach-nogo). At the end of each trial (after the choice), the instrumental stimulus (gem) disappeared and the outcome is

shown in the middle of the screen. In the avoidance blocks, instrumental stimuli (gems 7-12) are presented. Bad gems (gems 7-9) are to be avoided, whereas good gems (gems 10-12) are not to be avoided. Participants choose whether to escape from the gem (avoid-go; by taking a step to the side where a white frame is presented, the other side of where the gem is presented) or remaining in the middle (avoid-nogo). Participants are not told which gems are good or bad. Participants have to learn the correct choice by trial and error. Making the correct choice (approach block: approach-go for good gems, approach-nogo for bad gems; avoidance block: avoid-go for bad gems, avoid-nogo for good gems) will be reinforced probabilistically (either +10 cents for reward, or -10 cents for punishment; chance of a reward given the correct choice is 0.80). In total, the task consists of 240 trials, with 120 trials per block, and with 20 trials per instrumental stimuli, of which 10 were preceded by an angry facial stimulus and 10 were preceded by a happy facial stimulus.

Visual stimuli and timing for task 1

The visual stimuli that are presented for each participant, consist of faces from 20 models (10 male) taken from several databases (Ekman and Friesen 1976; Matsumoto and Ekman 1988; Martinez and Benavente 1998; Lundqvist et al. 1998). Each model shows 2 emotions (angry and happy), matched for brightness and contrast values, displayed against a black background. To exclude influence from hair and nonfacial contours, the faces are trimmed (Van Peer et al. 2007; Roelofs, Minelli, et al. 2009). On each trial, a face is presented centrally for 3000 ms. After 500 ms black screen, participants are required to make either a Go or a NoGo response as fast as possible within 2500 ms upon presentation of the instrumental stimuli. No response being made within 2500ms is recorded as a nogo response. After a stimulus-outcome delay of maximally 3000 ms, the outcome is presented for 1000 ms, (+20 cents for reward, -20 cents for punishment). The intertrial interval is jittered (3000 ± 1000 ms). Stimuli presentation and response acquisition are controlled by a PC running Presentation software 14.8 12.30.10.

Duration: 50 minutes

Outcomes in terms of FFFF

Approach/avoidance will be operationalized as time to approach/avoidance on correct trials (milliseconds).

This will be analyzed separately in two emotional contexts (happy or angry face)

Task 2

Step task

This task will be done on the stabilometric platform. This is a Wii balanceboard adjusted to measures spontaneous and nonspontaneous adjustments in body posture. Changes in pressure (through changes in body posture) can be measures in anterior-posterior as well as medio-lateral directions (Fig. 2). During the tasks, subjects will be asked to stand on the platform and watch pictures presented on a monitor (eye height to subject). Stimuli will be

presented in blocks, and each block will be preceded by new instructions. The instructions create congruent conditions (step away from angry faces (avoid) and step towards happy faces (approach)) and incongruent conditions (step away from happy faces (avoid) and step towards angry faces (approach)).

Stimuli:

40 actors, per actor 3 emotions (angry, happy, neutral)

Blocked design; 6 blocks consisting of 3 congruent and 3 incongruent conditions

For task 2 and 3 same stimuli will be used consisting of pictures of human actors portraying either facial emotions of anger, happiness or neutral expression (version 1 of task 2 and 3) or whole body expressions of anger, happiness and neutral (version 2 of task 2 and 3).

Trial details

each stimuli will be presented for 3 seconds, followed by a black screen for 4-6 seconds. On average a trial then lasts 8 seconds.

the task will first be performed with pictures of faces only (version 1) followed by pictures of whole body expressions (version 2).

the total duration of the experiment is 16 minutes

Outcomes in terms of FFFF

Approach/avoidance will be operationalized as time to approach/avoidance on correct trials (milliseconds).

Task 3

Freeze task

In this task the same platform will be used as well as the same stimuli (see below). During this task however, subjects only have to passively view the pictures while standing quietly on the platform. The outcome measures are small variations in body sway during viewing of these stimuli (changes of amount pressure and standard deviations in changes of location of pressure)

Stimuli:

20 actors, per actor 3 emotions (angry, happy and neutral)

Blocked design; 3 blocks with one emotion per block, total 20 stimuli

For task 2 and 3 same stimuli will be used consisting of pictures of human actors portraying either facial emotions of anger, happiness or neutral expression (version 1 of task 2 and 3) or whole body expressions of anger, happiness and neutral (version 2 of task 2 and 3).

Trial details:

each stimuli is presented for 3 seconds

each block is followed by a 5 second black screen before a new block starts again two versions will be done, one with only faces, and one with whole body expressions

Duration: 4 minutes

Outcomes in terms of FFFF

Freeze will be operationalized as the standard deviation in body sway.

Hormonal measures

Before and after the three experimental tasks, subjects will be asked to provide saliva. They will spit through a straw into a little plastic tube (50µl). Analysis will reveal levels of cortisol and testosterone. Supplies will be used from Salicap collection devices (IBL International, Hamburg, Germany). All tubes will be stored at -20 °C. Biochemical analysis of free cortisol will be done by *competitive electrochemiluminescence immunoassay (ECLIA, Elecsys 2010, Roche Diagnostics). Testosterone concentrations will be determined using competitive chemiluminescence immunoassay (LIA) with a sensitivity of 0,0025 ng/ml (IBL, Hamburg, Germany).

Subjects have to act according to the following rules in order to get valid and reliable samples:

- No coffee, tea, chocolate, cola or alcohol on the day of testing
- no extensive physical exercise on the day of testing
- no more than 5 cigarettes on the day of testing before the session begins
- Minimal one hour before the start of the measurement no eating, smoking or drinking (with the exception of water) is allowed. After the session everything may be eaten again.

Duration: 5 minutes

Picture rating

After the experimental tasks, subjects will rate each stimuli on a 9-point likert scale on both arousal (not at all - absolutely) and valence (very happy - very angry).

Heart rate measures

To have an autonomic measure of reactivity to stimuli we will measure heart rate during the experimental task using 5 lead setup to ensure accuracy.

Questionnaires

MINI and SCID as DSM interviews; NLV for IQ level; STAI, STAXI, LsAs for fear, anxiety and anger; RPQ and IPAS for aggression, LEQ (stressful life events)

Study burden and risks

no risk involved

Contacts

Public

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

Adults (18-64 years)

Elderly (65 years and older)

Inclusion criteria

a) patients: Male, aged 18-65, minimum IQ 80, max 120kg (restrictions of platform) body weight, violent crime has been committed

b) healthy controls: Male, aged 18-65, max 120kg body weight, maximum education is HBO (to ensure matched IQ levels in both groups).

Exclusion criteria

a) patients: DSM Axis 1 disorder, use of psychopharmaca, neurological disorder

b) healthy controls: DSM Axis 1 or 2 disorder, use of psychopharmaca, history of violent behaviour, criminal record, neurological disorder

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Diagnostic

Recruitment

NL	
Recruitment status:	Recruitment stopped
Start date (anticipated):	01-07-2012
Enrollment:	80
Type:	Anticipated

Ethics review

Approved WMO	
Date:	08-06-2012
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO	
Date:	18-03-2014
Application type:	Amendment
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL40379.091.12