Who is the Mole?

Determining Hostile Intent in Groups with GPS and Survey Data

Carsten van Roon, Peter W. de Vries and Mariëlle Stel

Dept. Psychology of Conflict, Risk & Safety, University of Twente

PO Box 217, 7500 AE Enschede, The Netherlands

Abstract

Past events indicate that it is seems difficult to distinguish individuals that harbour hostile intentions from individuals that do not in violent collectives. The current study tried to distinguish these hostile individuals by relating GPS data with survey data in small groups within a manipulated and competitive field game setting. Two games were played in this setting where four participants had to compete against each other where one of them, called the mole, had foul intentions and tried to sabotage the group's performance. Results showed that participants diverged on the measure of intra-group distance dependent mainly on fright, but also on the trait agreeableness. The former resulted in smaller distances and the latter in greater distances. At the same time the deceptive and sabotaging mole contemplated and harboured more hostile intentions than other participants. The experiment showed cautious, yet fruitful future endeavours in detecting hostile intent in small groups who could be part of larger violent collectives. Intra-group distance and hostile individuals is therefore an area where more work could be conducted.

Keywords: Mole, Saboteur, Hostile intent, Groups, GPS, Survey

Introduction

Past incidents evidently showed that it seems difficult to distinguish individuals that harbour hostile intentions. For instance, in the western part of the Netherlands the Veronica Sunset Grooves dance event escalated into a violent incident between participants and police forces (Muller, 2011). Multiple smaller incidents occurred at the event where small groups of Hooligans from soccer club Feyenoord clashed into violence with local police forces. Shots have been fired by police forces resulting in innocent casualties and even one death. However, the eruption of these incidents can be traced back to one of the hostile individuals initiating the violence. This is just one example amongst others indicating magnitude of collective violence in general (Tilly & Tilly, 2013). If behaviour of such hostile individuals could be pinpointed more accurately and anticipated beforehand this could possibly result in preventing the incident from happening in the first place.

Therefore, it seemed necessary to pre-emptively detect such individuals' hostile intent in order to prevent a disastrous outcome, such as the dance event. Additionally, when considering that more and more events take place nowadays which could result in an increased risk for this undesirable behaviour to take place and consecutively into violence (Eventbrite, 2019). It is moreover difficult to take precautionary measures in order to detect such kind of individuals that portray hostile intent (Wijn, van der Kleij, Kallen, Stekkinger, & de Vries, 2017). Evidently, if a perpetrator is earlier detectable it might be easier for authorities to engage in proper prevention.

Taken the previous mentioned all together, the scope of this study pertains more specifically to discerning the behaviours of these individuals within groups that gather in the context of events such as festivals, concerts or sports. From a theoretical point of view it was important to investigate hostile intent because past research has indicated that this intent was related to individuals mental states (Wijn et al., 2017) and personality traits(Satchell et al.,

2017). Moreover, recent research has shown that it was possible to connect mental states of individuals such as anxiety to behavioural movement variables measured by Global Positioning Systems (GPS) within groups (Ziepert, de Vries, & Ufkes, submitted). In addition, currently not much research has been done on the topic of relating hostile intent to movement variables (Ziepert et al., submitted). Therefore, this paper extends the previous mentioned research to investigate individuals within groups in order to distinguish hostile intent. The focus hereby was on traits and underlying mental states related to such intent and linking them to movement variables.

In order to forge an attempt to somehow mimic the aforementioned a simulated and competitive field game experiment was played. In this experiment groups of four individuals participated where GPS and survey data were gathered and analysed. The reason for this particular setup was that a field experiment of this kind with a large amount of participants were too complex to design in order to mimic hostile intent within groups that were part of larger collectives. Therefore, the research question was: How can hostile intent be determined in individuals within manipulated competitive groups by means of relating GPS data with survey data in a field game setting?

Theoretial Framework

Hostile intent. The intent of an individual to harm other people can be understood as hostile intentions (Wijn et al., 2017). It is shown in research that individuals that carry these intentions will most likely try to hide it when they expect that others know about it (DePaulo et al., 2003; Ekman, Friesen, & O'Sullivan, 1988; Koller, Wetter, & Hofer, 2016; Wijn et al., 2017). Individuals hiding this intent were important because the current study attempted to unravel this hidden intent by investigating traits and mental thought processes related to this. Moreover, research by Wijn et al. (2017) propose that individuals who portray hostile intent are successively more prone to mental states that are related to anxiety, self-focus and

vigilance. As a result this may influence their susceptibility to react more to environmental cues. Consecutively, these individuals' increased reactiveness to external cues of being exposed prompts a fight or flight response (anxiety-related response). Hence, more aberrant behaviour is elicited by individuals who harbour hostile intent in concurrence with an increased cognitive load. Therefore these individuals perceive related environmental cues more intense (Wijn et al., 2017; Ziepert et al., submitted).

Moreover, studies conducted in the field have shown that it is possible to connect specific bodily movements of individuals measured by GPS with motivations or conscious decisions (Bouma et al., 2014) possibly reflecting personality traits (Satchell et al., 2017) or mental states that are related to hostile intent (Wijn et al., 2017). Finally, few studies examine the relationship between movement and psychological variables such as personality traits (Satchell et al., 2017) or mental states (Palmius et al., 2017; Saeb et al., 2015).

In addition, nowadays an easier attempt can be forged to somehow measure hostile intent by means of location data. The reason for this is that individuals that gather in masses at events as mentioned in the introduction most likely carry mobile phones. These phones send location based signals from which individuals movements can be deduced (Kjærgaard et al., 2013). Furthermore, individuals at such events can make use of publicly accessible Wi-Fi hotspots which are provided by the event organiser after registering on the hotspot (Chilipirea, Petre, Dobre, & Van Steen, 2016). Individuals will use these Wi-Fi hotpots because when they gather in masses at such events then consequently their mobile internet connection drops. Therefore, they will most likely resort to the use of publicly accessible Wi-Fi which could possibly be tracked by the authorities in case deviant behaviour is detected.

Mental states. Furthermore, several studies have illustrated that the mental state of fear corresponds to movements of participants indicating that when they felt fearful then they walked closer together (Brady & Walker, 1978; Feshbach & Feshbach, 1963; Schachter,

1959; Ziepert et al., submitted) or walked slower (Barliya, Omlor, Giese, Berthoz, & Flash, 2012). In addition, it might be interesting to examine joy and anger as well because these states are related in past research to increased walking speed (Barliya et al., 2012; Gross, Crane, & Fredrickson, 2012; Michalak et al., 2009). In conclusion, fear could be linked to hostile intent while joy and anger might be related to non-hostile intent, which can both be states that participants experience during the games of the experiment.

Therefore, the current study examined hypotheses that were related to mental states underlying hostile intent. To start with, it is assumed that that self-reported feelings of *anxiety* are related to a smaller averaged *intra-group* of participants measured by GPS trackers during the games (**hypothesis Ia)**. This is in agreement with preceding research clarifying that individuals move closer together when encountering a threat (Brady & Walker, 1978; Feshbach & Feshbach, 1963; Schachter, 1959; Ziepert et al., submitted). In context of the current research this threat can be understood as participants' perception of loosing or winning the game. Subsequently, this would reinforce competitive behaviour amongst participants. This threat in turn could result in feelings anxiety while others feel anger or joy. A short elaboration of the current study and the games is discussed in the next section, *Current Study*.

In addition, as Ziepert et al. (submitted) could not demonstrate that feelings of anxiety were related to a slower pace by means of encountering a threat, as is done in other research by Barliya et al., (2012). Ziepert et al. (submitted) explains this result due to the fact that participants considered a slower pace as suspicious behaviour. The current study will re-examine this relationship however, tuned to the game setting stating that: some participants will feel more anxiety resulting in a slower pace during the games because of the competitive game environment. Thus, the second hypothesis was: self-reported feelings of *anxiety* were related to smaller averaged *velocity* of participants measured by GPS trackers during the

games (**hypothesis Ib)**.

Furthermore, multiple studies have demonstrated that increased walking speed of individuals is related to mental states of anger or joy (Barliya et al., 2012; Gross et al., 2012). Individuals experiencing anger or joy were measured with bodily instruments that indicated an increase of bodily movements that referred to increased walking speed. In context of the current study joy and anger can be experienced by participants due to the competitive environment. Therefore, the current study additionaly examined whether self-reported feelings of a) *joy* (**hypothesis IIa**) and b) *anger* (**hypothesis IIb**) were related to a larger averaged *velocity* of participants measured by GPS trackers during the games.

Trait. Agreeableness is to be defined as one of the widely researched five factor personality dimensions of the Big Five being empathetic, cooperative, altruistic, socially harmonious, pleasant and likeable of an individual in relation with others (Graziano & Tobin, 2009). The other end of the dimension describes individuals that are selfish, lack empathy, manipulative and extremely competitive. In context of the current research it is expected that agreeableness is related to the mental states anxiety, anger and (non) joy underlying hostile intent.

More specifically, special interest lies in individuals that are extremely competitive or extremely non-competitive and how these two contrasting ends relate to (non-)hostile intent. Moreover, the personality trait of agreeableness has been associated in previous research with increased walking speed (Satchell et al., 2017). However, it is important to note that Satchel et al. (2017) or other research did not distinguish whether low or high scores of agreeableness were related to increased pace of individuals. Therefore, in context of the current study it is expected that low scores (more competitive) will move faster than the high scorers. Thus, the current study finally explored whether self-reported low scores on agreeableness were related to a larger averaged velocity during the games (**hypothesis III)**.

Current Study

The present study characterised a field experiment wherein two competitive games were played. Within these games the explained concept of hostile intent with its related mental states and personality trait was tested with hypotheses. Participants were divided into groups of four. They played the first game consisting of the following two sub games: 1) ball throwing and 2) cards game. In this game they got acquainted with one another and competitive behaviour was elicited for the first time amongst all four participants. Next, they played a second game again consisting of two sub games: 1) moving a pylon with ball on top of it and 2) collect sentences to create a story that induced even more competitive behaviour amongst participants. Participants needed to score and collect as much money (mollar) in both games to win the competition. In addition, participants were scored on their performance on individual level and group level. One of the participants was a saboteur (mole) that tried to sabotage group's performance (how much money a group gained in total). Only one participant who was not the mole could win the overall competition in exchange for a reward. GPS trackers recorded participants movement during the games in order to relate to mental states and the personality trait. The personality trait questionnaire was filled in before the first game along with demographics. After each game a questionnaire was filled in that referred to participants mental states during the game in question. Hypotheses were tested by means of relating movement variables measured by GPS trackers to psychological variables measured by questionnaires. The hypotheses are summarised below. The hypotheses are furthermore illustrated in figure 1 below, also known as the theoretical framework describing the relationships between the variables.

Hypotheses

I. a Self-reported feelings of *anxiety* were related to a <u>smaller</u> averaged *intra-group distance* of participants measured by GPS trackers during the games.

b Self-reported feelings of *anxiety* were related to <u>smaller</u> averaged *velocity* of participants measured by GPS trackers during the games.

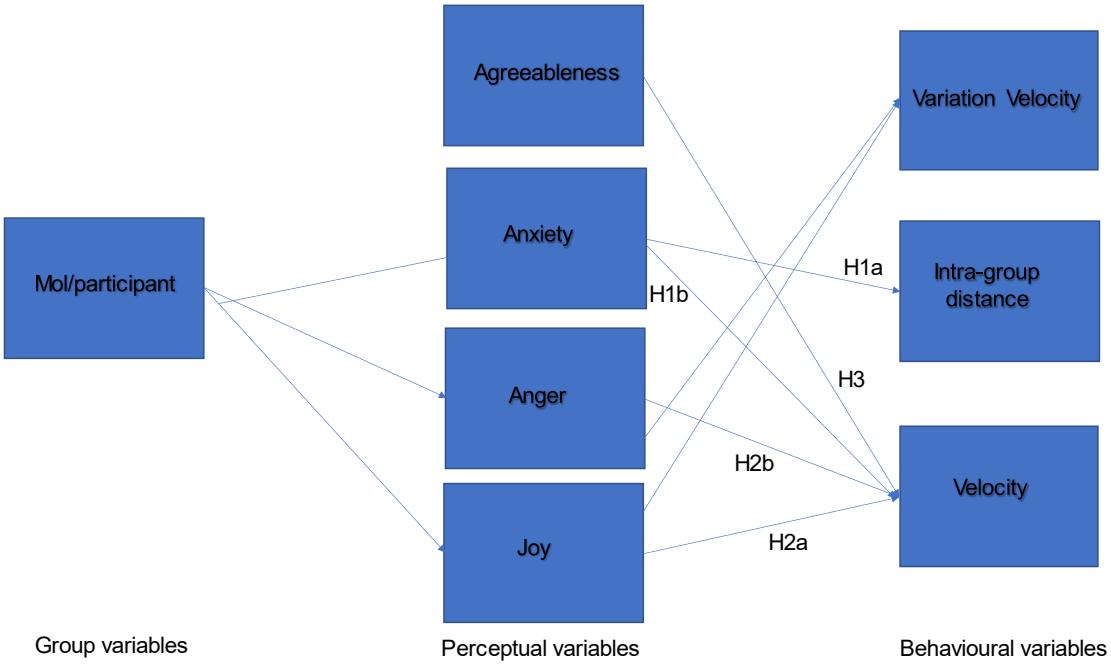
II. a Self-reported feelings of *joy* were related to a <u>larger</u> averaged *velocity* of participants measured by GPS trackers during the games.

b A Self-reported feelings of *anger* were related to a <u>larger</u> averaged *velocity* of participants measured by GPS trackers during the games.

III. Self-reported low scores on *agreeableness* were related to a <u>larger</u> averaged *velocity* during the games.

Figure 1

Theoretical Framework portraying the Hypotheses between Variables



Methods

Participants

There were 14 sessions of the field experiment conducted with 56 participants in total which took place in August, September and October of 2019. Participants were recruited via the UT research participation system SONA, student association of psychology, social media channels, students from the psychology course risk & leadership and by means of participants found ad-hoc on campus. The incentive for participation in the experiment was to have a chance to win a Huawei Band 2 Pro Activity tracker that costed approximately 50 euros. Thus, participants were recruited based on availability and willingness to participate, in other words convenience sampling (Guo, Logan, Glueck, & Muller, 2013). Since the field experiment setup did not differ per each unique group of four participants that attended a session there were no analyses between the different sessions (14). No participants were excluded from initial data collection.

Next, descriptives for the total sample (N = 56) and sub samples for participants (n_1 = 42) and moles (n_2 = 14) are shown. First, the total sample consisted of 22 males and 34 females. The average age in this sample was 21.95 year (SD = 3.79) with a minimum of 18 and a maximum of 41 years old. The nationality of the total set of participants were 28 Dutch, 23 German and 5 other nationalies. Additionaly, there were 16 males and 26 females in the participants sub-sample. Average age in this sub sample was 22.10 years (SD = 4.08) with a minimum of 18 and a maximum of 41 years old. Nationalities were 21 Dutch, 16 German and five other nationalities. Finally, in the sub sample of moles there were six males and eight females. The average age of the moles was 21.50 years (SD = 2.85) and ranged from 19 to 27 years old. In this subsample there were 7 Dutch and 7 Germans.

Design

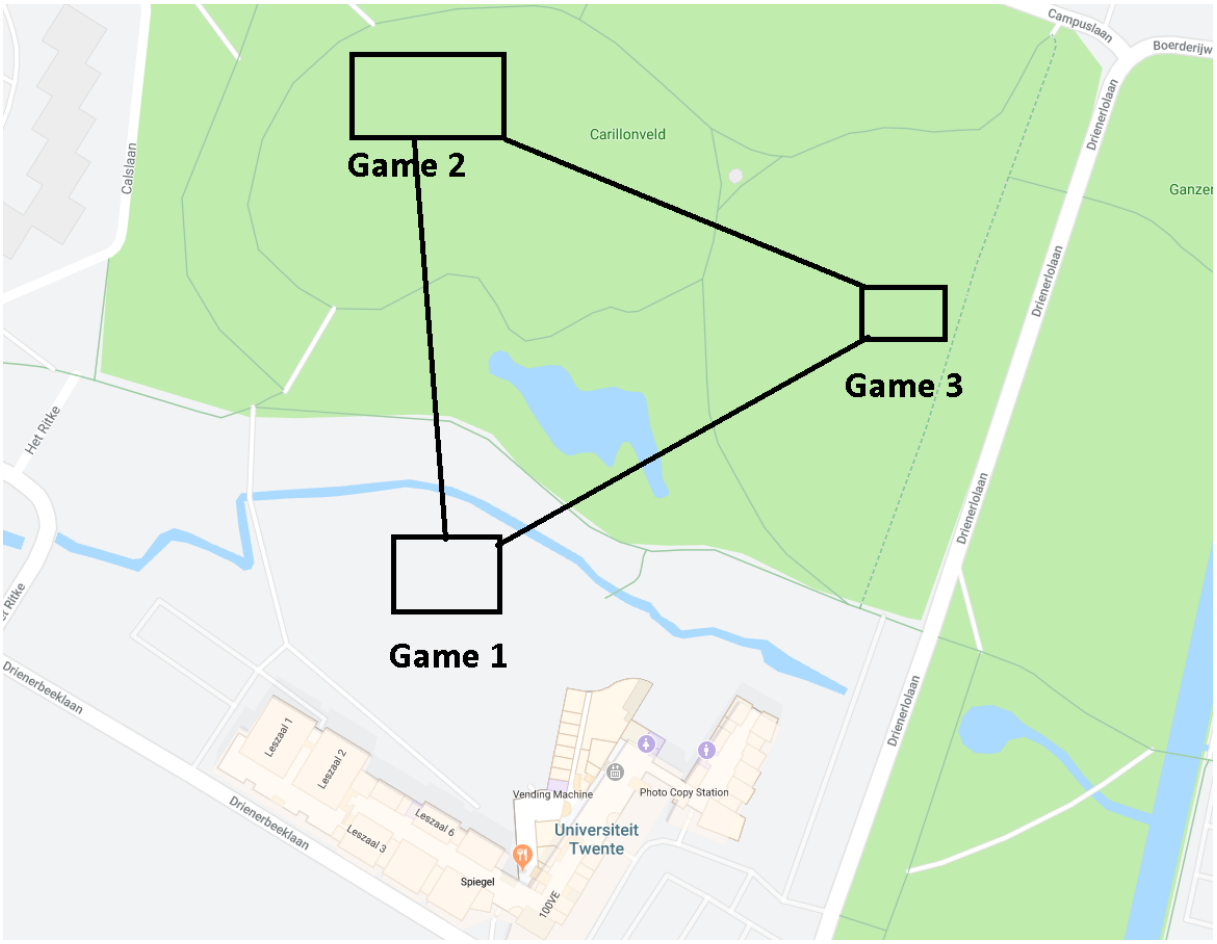
The experiment had a between-participants design. The independent variables were the questionnaire variables that referred to mental states and the trait agreeableness. The dependent variables were the GPS variables: velocity, variation velocity and intra-group distance. Agreeableness was measured before game 1 and the states were measured directly after each game. The behavioural movement variables were measured continuously during the games.

Procedure

The experiment took place at the Carillon field on the campus of the University of Twente where participants played two games which were based upon the Dutch television show Who is the Mole. Appendix 1 can be visited for more details about the background of Who is the Mole show and game. The total time needed for completing the experiment was approximately one hour to one and a half which included time for briefing, filling in the questionnaires and debriefing. Each game lasted for 5 minutes. Before participants actually engaged in the experiment they were asked to answer the trait questionnaire about agreeableness that was related to whether they thought they were competitive or not. For an overview of the locations and games please consult figure 2 below. Please note that there was no game 3, this was the debriefing point. Participants were convinced that they still had to play a third game. This was needed in order to stay into the game setting for adequate measuring. Thus, only 2 games to be considered.

Figure 2

Field Experiment Setup for Game 1 and 2 with Game 3 being the Debriefing Point



Next, the architecture of the experiment was explained beforehand and they received written instructions on how to play the games. Informed consent (Appendix 2) was asked and written down and participants were also informed by the general information sheet (Appendix 3). There was room for participants to ask questions to the research confederate about the research. Emphasized was that they can always withdraw whenever they wanted, also during the experiment and that all data considering their participation was treated and used solely for this research, thus anonymously.

Participants wore two IGOTU GPS trackers for field experiment session 1-13 and in session 14 they wore three of these trackers. At least two trackers were needed in order to maintain a stable and accurate measuring of participants movements if either one of the

trackers sensors failed (See appendix 4 for description of the GPS tracker). The research confederate enabled the GPS tracker to start measuring participants movements. The trackers measured every second on spatiotemporal parameters such as longitude and latitude of the participant's location.

Furthermore, participants were told that there was a competition between the participating groups completing this Who is the Mole game sessions. This was also shown on a physical leadership board (See appendix 5) that showed the performance (how much mollar (money) each group won) of each group in comparison with other groups. However, this was done at the end and not during the games to ensure that groups stayed motivated to play the game even though they could not win anymore.

In addition, performance scores of participants and moles within groups as well as scores on the group level were compared. However, only the scores of groups were actually tracked while the scores within groups were not. The latter was communicated to participants in order to stir up the competitive behaviour between participants in the group in terms of manipulation. It was also communicated that when a group member scored low on a game this impacted his own score but also the group’s performance on average. Furthermore, it was communicated that all the individual winners of all groups were compared by how much mollar they had won. Based upon who won the most mollar the winner was elected. In addition, it was communicated that everyone in a group played to win a prize pot. However, not the mole because he or she tried to sabotage the group’s performance.

In short, in each game the mole tried to sabotage the group's performance by letting them earn less money in mollar. After each game participants had to answer a questionnaire containing questions about the mole and questions related to the measured variables in this research. It was communicated that the group member that answered the least questions correctly scored the least points according to the research confederate, which was actually

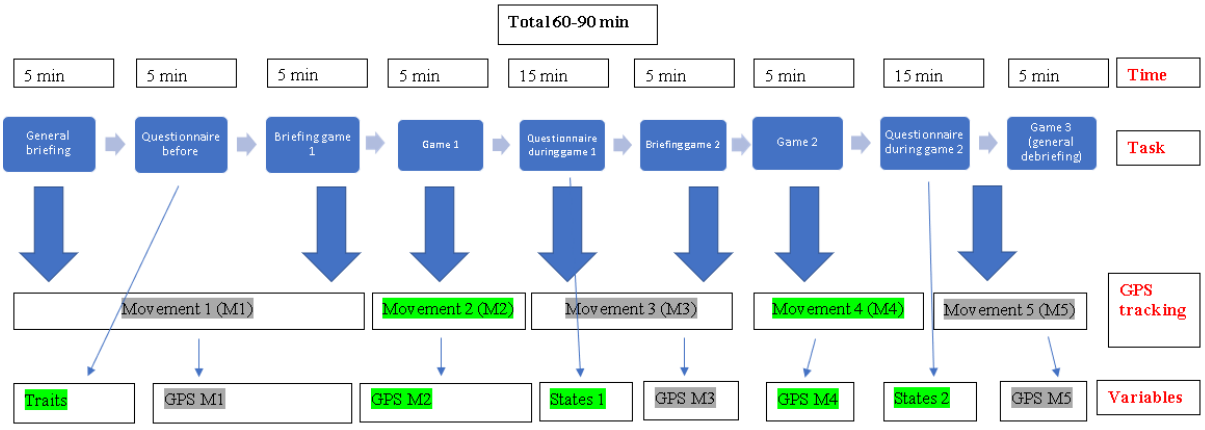
again part of the manipulation. This was another reinforcing factor that was intended to increase competitive behaviour within the group.

Participants then moved to the Carillon field where on two designated spots games were played consecutively after each other. See figure 2 for the map with locations. Every participant of the group then got a form with instructions from the confederate that showed whether he or she was a participant or the mole. They had to keep this for themselves and fold it twice so no one could see what was on it. Then they had to give it back to the confederate. Everyone then received instructions on how to play the games. In addition, the mole received special instruction that helped him sabotage the group's performance for each game. However, these instructions were subtly concealed within the general instruction papers everyone had received from the confederate. Therefore, no one could see who the mole was. Next, participants started the first game. (See appendix 6 for instructions per group, participant and mole. Before they started to play game 1 they filled in questionnaire I which referred to demographics and the trait agreeableness (See appendix 7).

In figure 3 below an overview of the field experiment was visualised. It shows the timelines as well as which measures have been included with green colour and which measures have been excluded with grey colour. In red colour the different categories were illustrated.

Figure 3

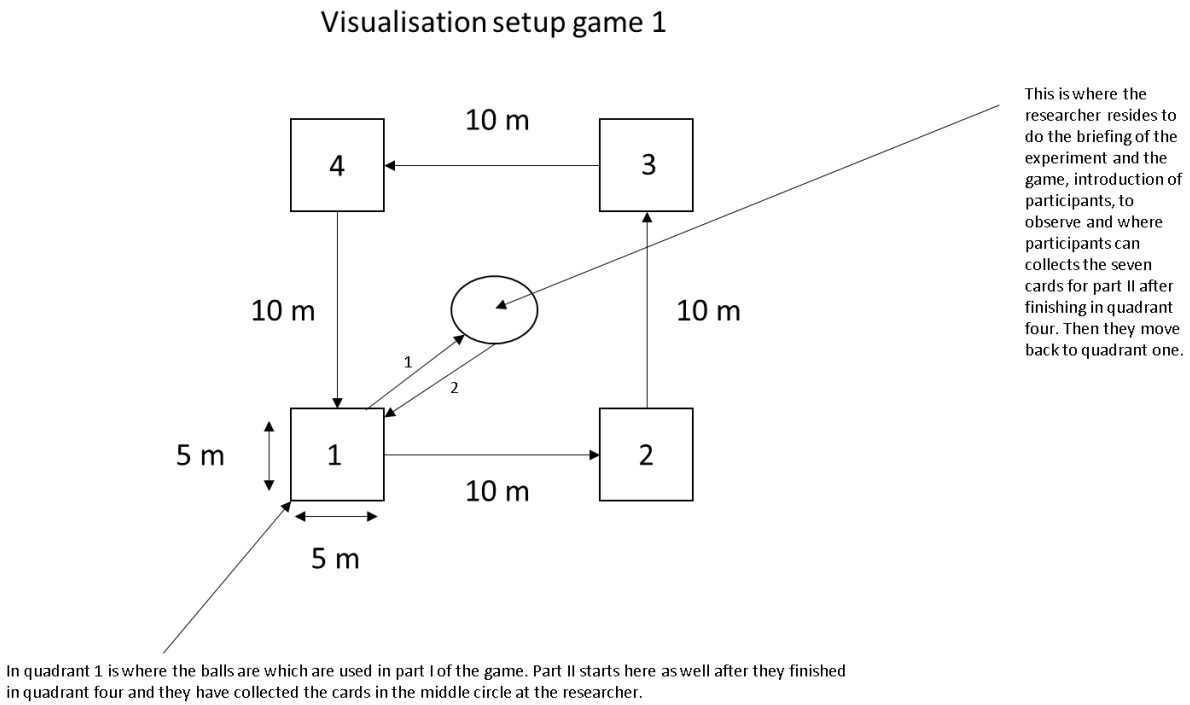
Overview Field Experiment Setup with included Measures (green) and excluded Measures (grey) and in Red text the Level of Categories each Row refers to



Game 1: Ball & Cards game. Participants were asked to play the first game which was a throwing ball and cards game (View appendix 6 for game 1 specific instructions). Instructions were given orally at location 1 (See figure 4) and were also written on one page and could also be found in appendix 6. See figure 4 below for visualisation of game 1. For a detailed explanation of the mechanics in game 1 and their psychological functioning please consult appendix 8.

Figure 4

Overview Setup Game 1



In the first part of the game, everyone introduced themselves briefly and they had to come up with a group name that was enlisted on the leader scoreboard. Next, the group walked to the first quadrant of in total four quadrants which were all 10 meters apart marked by the confederate (see figure 4). The quadrants self were 5 by 5 meters. Then, they had to throw one ball to one another while speaking out loud the other participants name and additionally, another characteristic about him or her that was mentioned in the introduction. The group could earn increasingly more mollar by throwing the ball back and forth and mentioning correct information about each other while moving between the quadrants (See appendix 9 for scoring and rules criteria for game 1). However, the mole tried to subtly sabotage this process by letting the ball drop or mentioning wrong information about other group members.

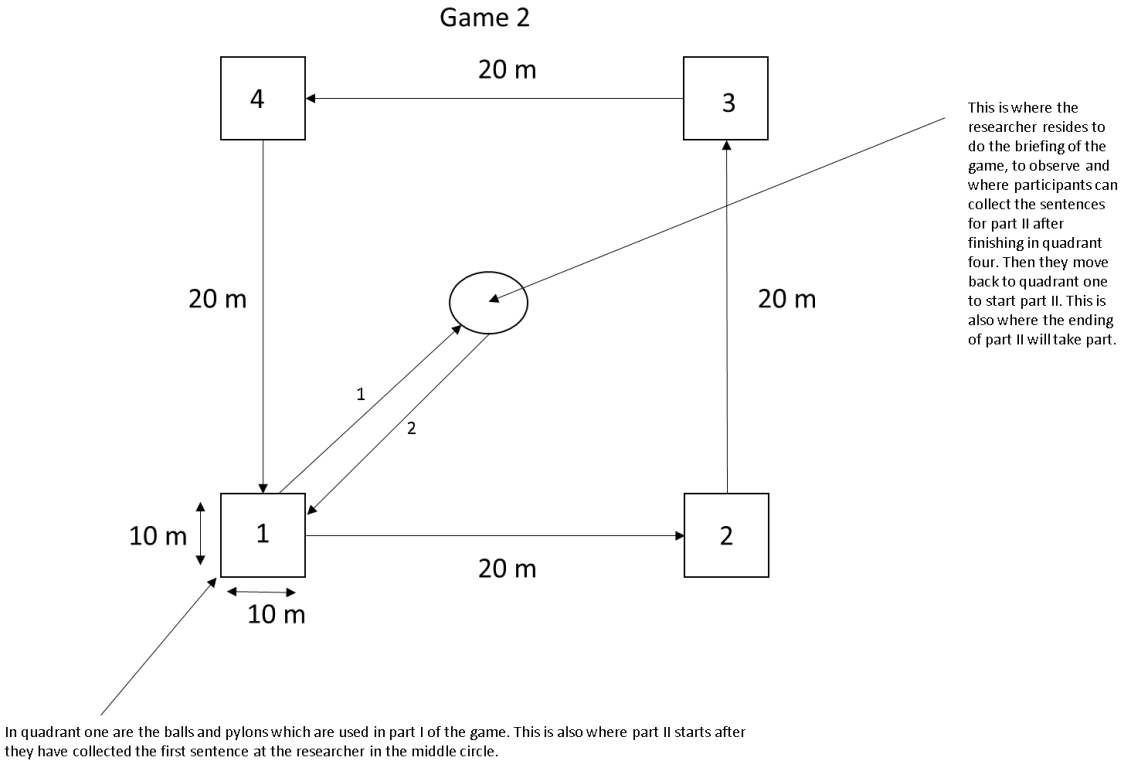
The second part of the game started when they had finished the first round (finishing

all four quadrants) and subsequently the group received seven coloured cards when they were back in the first quadrant (See figure 4). Next, participants needed to keep the cards above their heads in order to present an order of colours in each of the quadrants (Consult appendix 10 for colour combinations). Participants could again earn increasingly more mollar by presenting different arrangements of cards combinations per round. When an order was completed the first part of the game started again. However, the mole tried to subtly sabotage this process in part 2, for example by messing up the communication about the card combinations. After the game participants filled in the questionnaire detailing the researched variables and questions about the mole (See appendix 11 for questionnaire II and appendix 12 mole questions). They then handed the questionnaire in and they moved to the second and last game. Finally, the group was scored.

Game 2: Pylons & Stories game. The second game was about participants playing a pylons and stories game (please advise appendix 6 for game 2 specific instructions). Also, instructions were given in the same manner as in game 1 but in location 2 (See figure 2 and appendix 6 for detailed instructions game 2). For a detailed explanation of the mechanics in game 2 and their psychological functioning please consult appendix 13. See visualisation game 2 below in figure 5.

Figure 5

Overview Setup Game 2



The first part of the game started when participants needed to move all four pylons with balls on top of them from one quadrant to another. These quadrants were spaced out 20 meters apart from each other which were marked by the confederate (See figure 2 for location 2 of game 2 and figure 5 for setup game 2). Participants had to move the pylons with balls on top from quadrant to quadrant in order to win increasingly more mollar. Also, participants could get a penalty if the ball fell on the ground and, then they had to start over in the previous quadrant. See appendix 9 for scoring and rules criteria for game 2. However, the mole tried to subtly sabotage the process in part 1 by example of letting group members let the ball fall on the ground.

The second part of the game started which was guessing the stories when one round of part 1 was completed. Participants then received a sentence written on a piece of paper which was a randomized sentence belonging to one of two stories. The faster the group completed a

round the more sentences the group could gather. When the game was concluded the group had to guess what the stories were about and had to write this down on a piece of paper and give this to the researcher. The group could earn increasingly more mollar per correct story guessed (see scoring and rules criteria). The content of both stories can be found in appendix 14 and the answer format for this part in appendix 15. Also, in the last part of game 2 part the mole tried to subtly sabotage the group's performance by causing confusion in guessing the stories. When the game ended; again same as before, participants filled in the questionnaires, the mole questions and the group got scored.

Debriefing point. Finally, participants were then instructed to play the last bonus game which was game 3. However, this was not actual the case but it was the debriefing of participants when they reached the last location, location 3 which referred to game 3 (See figure 2 for location and appendix 16 for debriefing form). Due to the scope of the current research this last part was not taken into account for analysis but only what occurred within game 1 and game 2. Please consult appendix 17 for all the materials needed for one group and session.

Measures

Questionnaires. The questionnaires in general articulated questions about agreeableness and mental states of participants. More specifically, in questionnaire I items were examined about agreeableness and demographic variables such as gender, age, education and nationality. Additionally, in questionnaire II the mental states of participants were examined in the current game. See appendix 7 for questionnaire I and appendix 11 for questionnaire II. A reliability analysis was conducted and Cronbach's alpha was calculated for each construct within the questionnaires. The internal consistency (Cronbach's α) between the items in the current study was greater than 0.7 for all constructs. Therefore, the questionnaires being used were considered reliable for further analysis. In the next two sections the trait and state

questions were further explained and elaborated.

Trait questions. The personality trait agreeableness was measured by 10 questions that were based upon the NEO-PI-3 inventory (McCrae, Costa Paul T, & Martin, 2005). Agreeableness is a dimension within the five factor dimension of personality. In context of current research it was used to examine its sub facet namely, competitiveness of participants in the games. As proven by McCrae et al., 2005 and by other past research it has shown high internal consistency reliability (Cronbach's α) and not susceptible to social desirable responses. This is furthermore supported in the current study by a Cronbach's alpha of 0.73 for the measured construct with items. A seven point Likert scale was used describing 1 ''Not at all'' to 7 ''Very much''. An example question is ''Please indicate the extent to which the following attributes apply to you: hostile''(Back, Schmukle, & Egloff, 2009). Examine appendix 7 for the trait questionnaire. Finally, trait questions 6 to 10 were negatively worded. Therefore these questions were recoded in order to be used in the reliability analysis. No questions were removed due to reliability analysis.

***State questions*.** Questions pertaining to mental and related states of participants were used to measure and relate to hostile intent and associated concepts while playing the game (Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., submitted). The questions used a seven point Likert scale detailing 1 ''Not at all'' to 7 ''Very much''. Appendix 11 to be found for the state questionnaire that was used to measure the states of participants during the game they just had played. The reliability in past research also supports the feasibility of the these constructs in context of relating these mental states to movements (Ziepert et al., submitted). However, not all state and related questions were used and some questions were modified or added to fit the current research context.

In the first place, questions were asked regarding contemplation of hostile intent and feelings of hostile intent in the games. Three adopted and adjusted questions for manipulation

of hostile intent were asked to check whether participants felt hostile or were motivated to sabotage to group's performance in the game (Hostile Intent) (Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., (submitted). Four items examined the degree to which a participant doubted themselves during the game (Contemplation of Hostile Intent) (Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., submitted).

Questions were asked pertaining to feelings of fright, anger and joy during the games. Five items adopted from (Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., submitted) but changed for current experiment that assessed whether participants felt frightened while playing the game (Fright). Five questions were based and changed to current game context that measured feelings of anger of participants in the current game (Spielberger, 2010). Four items measured feelings of joy of participants in the game which were based on past research and changed accordingly (Watkins, Emmons, Greaves, & Bell, 2017).

Questions were asked to tap into participants awareness and being targeted in the current game. Five items were adopted and changed to current game context tapped into participants awareness of inhibitory control (Awareness Cognitive Behaviour Change) and four items into awareness of physical movement (Awareness Physical Behaviour Change) (Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., submitted). Self-focus of participants was measured by four items (Situational Self Awareness) (Govern & Marsch, 2001; Stekkinger, 2012; Wijn et al., 2017; Ziepert et al., submitted). Five questions measured participants feeling of being a target by other group members in the game (Self as Target) which was adopted and adjusted from Ziepert et al. submitted, ; Stekkinger, 2012; Wijn et al., 2017. Please consult Wijn et al., 2017 for a more elaborate explanation of all the previously mentioned above states and their underlying mental processes and functioning.

Furthermore, there were items posed to participants that measured their strategy, willingness to deceive other participants and motivation during the games. One item was

adopted and adjusted from de Ziepert et al., (submitted) and measured the extent to which participants made other group members think he or she was the mole in the game (Strategy). One question was adopted and changed from (Wijn et al., 2017) to measure whether participants wanted to deceive their fellow group members during the game (Deception). Finally, a motivation question was asked to check whether a participant was motivated in the current game to attain a good score (Motivation) based upon Ziepert et al., (submitted).

Different items were removed for questionnaire II in either game 1 or game 2 to increase Cronbach's alpha. First, results of the reliability analysis for the above mentioned states indicated that in game 1 questions 24, 46, 47 and 49 were removed. Question 24 referred to item 1 of fright, question 46 and 47 respectively to items 3 and 4 of awareness physical behaviour change and question 49 to item 2 of dubious thoughts (contemplation of hostile intent). Finally, items were removed from the state questionnaire for game 2 for questions 45 and 47 which referred to items 2 and 4 of awareness physical behaviour change).

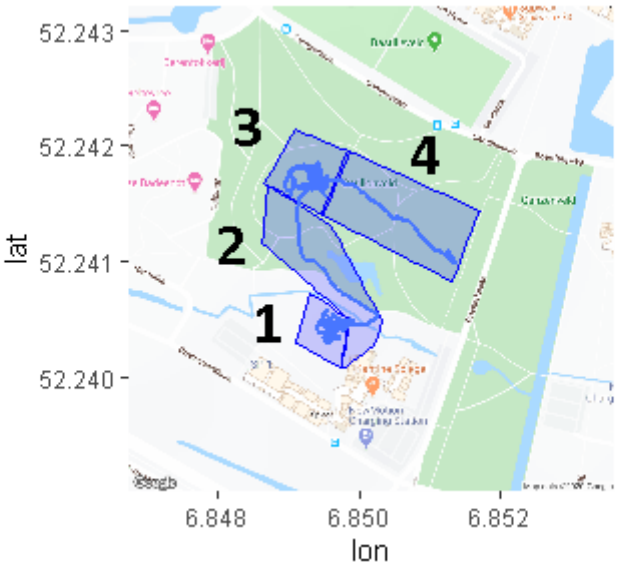
Last, feelings of being a group in the current game was measured by Interpersonal Connectedness (IC) and Group Cohesion (GC). IC was measured with Inclusion of Other in Self Scale (IOS) that reflects perceived IC of participants with other participants in the group (Aron, Aron, & Smollan, 1992). The construct was measured by a one item image where participants had to decide between seven figures depicting superimposed circles of which one part of the circle reflects the self and the other part the group. The scale was moreover not susceptible to social desirable responses, was psychometric valid and therefore as well evident in consistently aligning with different theoretical foundations related to individuals feeling close to each other as a group. GC was measured by a subscale of the Revised Substitute for Leadership Scale (RSLS) which also reflects the perceived GC of participants (Podsakoff, Niehoff, MacKenzie, & Williams, 1993). Moreover, the scale has been successfully used in past research therefore it was a reliable and valid scale. The subscale close, knit, cohesive and

interdependent groups was chosen because it reflects the cohesion dimension that was measured. For instance, a question was ‘‘There is much trust between group members’’ was a question measuring cohesion. No questions were removed after conducting the reliability analysis.

GPS measures. Participants wore multiple GPS trackers that resulted in GPS data that was converted to different parameters and consecutively in variables. Every participant from group 1 to group 13 carried two GPS trackers. The four participants from group 14 wore three trackers. Signals were received from GPS satellites and or towers which were saved every second in a GPS measure point. Parameters that were saved: latitude, longitude, elevation and time. These parameters served as input for computations resulting in the GPS variables used in this research such as velocity, velocity variation, intra-group distance for game 1 and, game 2. Velocity was gauged in average kilometres per hour between each measure point. Velocity variation was computed as the standard deviation in kilometres between each measure point. Intra-group distance was measured as the average distance in meters between each participant in the group. GPS measures were based upon earlier research by Ziepert et al., (submitted), in conjunction with use of the tool Psyosphere which also in this study proved purposeful. In figure 6 below the track of one participant was plotted during the entire field experiment.

Figure 6

Plotted Track of a Participant in the Entire Field Experiment where 1 was Polygon Game 1, 2 was Polygon Between Game 1 and Game 2, 3 was Polygon Game 2 and 4 was Polygon Between Game 2 and Finish (Debriefing Point)



Analysis

Preparing GPS data. GPS data was extracted from loggers and prepared and analysed with the software R package Psyosphere and accompanied by the manual for the same (Ziepert, Ufkes, & de Vries, 2018). A programming script in R was adopted from Ziepert et al., submitted; Ziepert et al., 2018 and extensively adjusted and recoded to the current study in order to properly prepare and analyse the GPS data (see appendix 18 for how to deliver the GPS data, appendix 19 for more detail on to preparing GPS data and, appendix 20 for Google API key that was needed for the mapping of tracks while scripting). Two polygons with GPS coordinates were selected that included only the area which included participants tracks during game 1 and game 2 (See figure 7 below for polygons with all participant tracks and appendix 21 for latitude and longitude coordinates that demarcated the polygons). Only accurate GPS data that converged in the polygons during the games was

included into the analysis because of the scope of the current study. Since participants wore 2 trackers in session 1-13 and 3 in session 14 the most accurate track was selected for further analysis and the other tracks were discarded. This means that the tracker with the most accurate representation and most GPS datapoints was chosen that indicated walking from begin to end without too much deviation caused by for example, sensor error. Also, all other data outside the polygons were discarded. A case by case inspection and selection was thus conducted.

Faulty data was excluded if it contained missing values caused by signal loss or in case of when the time interval exceeded one second. Missing values were automatically characterised by Psyosphere if a velocity of 10 km/h was exceeded and therefore excluded from the dataset. For instance, when the GPS tracker had signal loss then a high velocity could have been recorded. In addition, if there was more than one second between each GPS datapoint then this datapoint was marked as missing value and excluded from the dataset. Finally, when all filtering of the data was completed then the R package calculated the following GPS variables: velocity, velocity variation and intra-group distance. These calculated variables were exported into a excel file and merged with questionnaire data in SPSS.

Relating questionnaire variables with GPS variables. Statistics were computed in SPSS in order to determine relationships between agreeableness, state and GPS variables for either game 1 and game 2.

First, descriptive statistics and correlations were computed for the total participant sample (N =56) for GPS and questionnaire variables. Assumptions for correlation were checked. However, the descriptive statistics for the total sample were not in the scope for further analysis in the current study. The most important similarities for both games were viewed and discussed regarding correlations for trait, state and GPS variables.

Second, descriptive statistics were given for differences between moles and participants on variables Agreeableness, Fright, Anger, Joy, Contemplation of Hostile Intent and feelings of Hostile Intent during either game 1 and game 2. Due to the small sample size of moles ($n_2 = 14$) when compared to participants ($n_2 = 42$) a parametric test was not feasible to compare their means so these results and their descriptives were not reported. Therefore, a non-parametric test, the Mann-Whitney U independent samples test was conducted to achieve this goal. Note that analysing the differences between games were not in the scope of the current study for further analysis and therefore were not reported..

Last, inferential statistics detailed calculating a regression analysis for the total sample. The regression analysis used questionnaire variables as independent variables and the GPS variables as dependent variables. More specifically, multiple linear regression analyses were performed and six statistical models emerged. Assumptions for these regression models were checked and outliers were removed. After checking assumptions and when applying the stepwise, forward and backward statistical regression methods in SPSS, three models were retained. A precondition for using these methods was that first the outcome variables with all predictors were explored to inspect for outliers and if found, they were removed from further analyses. Finally, the hypotheses were checked during the regression analysis.

Exclusions. First, the leadership question was left out of the analysis because most data was invalid and incomplete. Also, GPS data between game 1 and game 2 and between game 2 and game 3 (debriefing point) were excluded due to the scope of the current study. Last, overall GPS data from begin till end of field experiment was excluded for the same reason. Rationale for only using GPS segments of game 1 and game 2 was that the movements of interest was in these games and the state questionnaires referred directly to them. Other segments do not directly relate to state questionnaires. The leadership question and GPS data of other segments could either be explored or analysed in future research.

Results

Hostile Intent with Motivation and Deception

Descriptive statistics were computed for the total participant sample (N =56) such as the means, standard deviations, and correlations and shown in table 1 for the trait agreeableness, states and GPS variables for game 1 and in table 2 the same for game 2. Remarkable results and observations regarding the correlations have been reported.

Correlation table 1 and table 2 showed that for all 56 participants in both games some state variables and the trait variable agreeableness correlate significantly with each other and, that the GPS variables do not or partly correlate with each other or with trait, or the state variables. It was interesting to note the similarities observed during both games in line with the scope of the current study related to variables Deception, Motivation and Hostile Intent.

First, Contemplation of Hostile Intent ($R_1 = .37$, $p_1 = .005$, $R_2 = .59$, $p_2 < .001$) and Hostile Intent ($R_1 = .51$, $p_1 < .001$, $R_2 = .70$, $p_2 < .001$) correlated both significantly with Deception. This simply would be explained by that participants thought about and felt hostile intentions while also trying to deceive their fellow group members while playing the games.

Second, Motivation correlated with Contemplation of Hostile Intent ($R_1 = -.34$, $p_1 = .010$, $R_2 = -.53$, $p_2 < .001$) and Hostile Intent ($R_1 = -.59$, $p_1 < .001$, $R_2 = -.72$, $p_2 < .001$). This means conversely that not motivated participants had contemplated more hostile intent and felt more hostile intent. This can be explained by that not motivated participants were less willing to get a good score for themselves and for the group while playing both game 1 and game 2. Therefore, they contemplated more hostile intent and felt more hostile intent towards other group members.

Finally, Motivation and Deception correlated significantly with each other ($R_1 = -.29$, $p_1 = .030$, $R_2 = -.53$, $p_2 < .001$). This means conversely that not motivated participants were

more likely to deceive their fellow group members during both games. This can be explained by that these participants did not want their fellow group members to get a good score and therefore deceived them.

Taken together, the these correlational findings suggest carefully that participants that tried to deceive their fellow group members harboured hostile intentions while at the same time they most likely were also not motivated to get a good score. This converged finding seems logical considering the nature of the competitive game setup wherein motivated participants would more likely collaborate with other group members in order to get a good score for themselves and for the group. On the other hand, less motivated participants would try to sabotage their group, which in this case potentially and sensibly could be identified as the mole.

Table 1

Descriptives and correlations for trait, states and GPS variables in game 1

		Mean	SD	1 R (p)	2 R (p)	3 R (p)	4 R (p)	5 R (p)	6 R (p)	7 R (p)	8 R (p)	9 R (p)	10 R (p)	11 R (p)	12 R (p)	13 R (p)	14 R (p)	15 R (p)	16 R (p)	17 R (p)	18 R (p)
1	Agreeableness	5.55	0.61	1.00																	
2	Strategy	2.27	1.52	-.15 (.269)	1.00																
3	Deception	2.51	1.52	-.03 (.851)	**.35 (.008)**	1.00															
4	Group Cohesion	4.7	1.03	.16 (.236)	**-.29 (.034)**	-.06 (.668)	1.00														
5	Inclusion of Other in Self	4.96	1.51	.04 (.750)	-.22 (.108)	.05 (.729)	**.38 (.004)**	1.00													
6	Self as Target	3.06	1.15	**-.27 (.047)**	.19 (.174)	.10 (.488)	-.10 (.460)	-.05 (.736)	1.00												
7	Fright	3.09	1.13	**-.29 (.029)**	.08 (.541)	.18 (.194)	.07 (.588)	-.06 (.665)	**.679 (<.001)**	1.00											
8	Anger	1.63	0.81	**-.47 (<.001)**	.04 (.752)	-.10 (.466)	-.20 (.134)	-.19 (.170)	**.30 (.024)**	**.34 (.011)**	1.00										
9	Joy	4.78	1.17	.13 (.337)	-.15 (.284)	-.23 (.086)	**.31 (.019)**	.31 (.022)	.05 (.719)	-.13 (.326)	**-.39 (.003)**	1.00									
10	Awareness Cognitive behaviour Change	3.35	1.37	-.22 (.100)	-.10 (.465)	.18 (.180)	-.08 (.559)	**-.41 (.002)**	.09 (.493)	.39 (.003)	**.32 (.014)**	-.25 (.064)	1.00								
11	Awareness Physical behaviour Change	2.75	1.22	-.18 (.193)	.02 (.909)	.15 (.290)	.10 (.472)	-.06 (.641)	**.43 (.001)**	**.492 (<.001)**	**.271 (.043)**	-.14 (.299)	**.34 (.011)**	1.00							
12	Contemplation of Hostile Intent	2.95	1.59	-.02 (.885)	.08 (.570)	**.37 (.005)**	-.03 (.855)	**-.38 (.004)**	**.29 (.032)**	**.50 (<.001)**	.09 (.528)	-.10 (.459)	**.56 (<.001)**	**.36 (.006)**	1.00						
13	Situational Self Awareness	4.43	1.34	.16 (.232)	-.07 (.609)	.20 (.137)	-.04 (.762)	-.10 (.473)	-.05 (.703)	-.15 (.263)	-.09 (.519)	-.16 (.251)	**.267 (.046)**	-.03 (.799)	.08 (.567)	1.00					
14	Hostile Intent	2.3	1.6	-.07 (.593)	.21 (.127)	**.51 (<.001)**	-.25 (.064)	-.12 (.366)	**.29 (.032)**	.21 (.126)	.12 (.374)	-.16 (.235)	**.40 (.002)**	**.37 (.004)**	**.50 (<.001)**	.19 (.163)	1.00				
15	Motivation	5.59	1.9	-.20 (.131)	**-.31 (.022)**	**-.29 (.030)**	.07 (.599)	**.29 (.029)**	<.01 (.998)	.01 (.918)	-.09 (.497)	.08 (.535)	**-.31 (.020)**	**-.26 (.047)**	**-.34 (.010)**	**-.22 (.099)**	**-.59 (<.001)**	1.00			
16	Velocity	0.82	0.91	-.14 (.319)	.21 (.126)	.05 (.711)	-.19 (.153)	.20 (.149)	.06 (.661)	-.01 (.970)	.22 (.109)	**-.30 (.024)**	-.14 (.286)	.07 (.583)	-.04 (.762)	-.07 (.599)	.22 (.099)	-.13 (.353)	1.00		
17	Variation Velocity	1.69	0.35	-.06 (.650)	-.07 (.589)	-.15 (.260)	-.07 (.607)	.09 (.509)	.09 (.492)	-.01 (.930)	.14 (.293)	.11 (.437)	.07 (.605)	.24 (.079)	.05 (.703)	-.01 (.953)	.14 (.303)	-.02 (.873)	**.41 (.002)**	1.00	
18	Intra-group Distance	14.91	6.44	.23 (.091)	.09 (.524)	-.13 (.345)	-.22 (.103)	-.02 (.874)	-.02 (.888)	-.03 (.847)	-.13 (.326)	.10 (.466)	-.06 (.672)	-.13 (.358)	-.05 (.693)	-.16 (.243)	-.13 (.354)	.06 (.674)	.10 (.450)	**.36 (.007)**	1.00

Note. P-values lower than .050 shown in **bold**.

Table 2

Descriptives and correlations for trait, states and GPS variables in game 2

	Mean	SD	1 R (p)	2 R (p)	3 R (p)	4 R (p)	5 R (p)	6 R (p)	7 R (p)	8 R (p)	9 R (p)	10 R (p)	11 R (p)	12 R (p)	13 R (p)	14 R (p)	15 R (p)	16 R (p)	17 R (p)	18 R (p)
1 Agreeableness	5.55	0.61	1																	
2 Strategy	2.75	1.90	-.19 (0.153)	1.00																
3 Deception	3.00	1.99	-.21 (0.126)	**.58 (<.001)**	1.00															
4 Group Cohesion	4.00	1.31	0.14 (0.297)	0.10 (0.452)	0.01 (0.935)	1.00														
5 Inclusion of Other in Self	3.87	1.63	.03 (0.818)	-.02 (0.913)	-.14 (0.305)	**.56 (.001)**	1.00													
6 Self as Target	**3.09**	1.43	**-.27 (.046)**	.21 (0.125)	.25 (0.061)	.06 (0.637)	-.13 (0.347)	1.00												
7 Fright	**3.45**	1.30	**-.34 (.010)**	.15 (0.263)	.04 (0.742)	-.10 (0.448)	-.23 (0.088)	**.65 (<.001)**	1.00											
8 Anger	**1.88**	1.00	**-.28 (.039)**	-.06 (0.651)	.09 (0.497)	-.03 (0.809)	-.03 (0.821)	**.36 (.006)**	**.62 (.000)**	1.00										
9 Joy	4.38	1.43	.08 (.540)	.20 (.135)	.07 (.624)	.04 (.765)	.22 (.106)	**-.28 (.040)**	**-.32 (.016)**	**-.47 (<.001)**	1.00									
10 Awareness Cognitive behaviour Change	3.26	1.32	-.24 (.077)	-.03 (.853)	**.32 (.017)**	-.22 (.097)	**.32 (.019)**	**.31 (.021)**	**.44 (.001)**	**.40 (.002)**	**-.34 (.011)**	1.00								
11 Awareness Physical behaviour Change	3.93	1.48	-.15 (.282)	-.04 (.761)	-.02 (.907)	.01 (0.953)	-.06 (0.641)	.14 (0.308)	.21 (.127)	.26 (.059)	.01 (.925)	.06 (0.687)	1.00							
12 Contemplation of Hostile Intent	2.70	1.32	-.15 (.290)	.26 (.055)	**.59 (<.001)**	-.18 (0.179)	**-.49 (<.001)**	**.53 (<.001)**	**.50 (<.001)**	**.42 (.001)**	**-.32 (.016)**	**.59 (<.001)**	.20 (0.144)	1.00						
13 Situational Self Awareness	4.47	1.42	.01 (.961)	.05 (.711)	.24 (0.080)	-.10 (0.462)	-.09 (0.523)	.08 (0.555)	-.06 (.658)	.08 (.584)	-.15 (.288)	.24 (0.083)	.04 (0.797)	.21 (0.130)	1.00					
14 Hostile Intent	2.59	1.94	-.16 (.243)	**.42 (.001)**	**.70 (<.001)**	-.05 (0.712)	-.19 (0.161)	**.28 (.036)**	.15 (.274)	.04 (.748)	.04 (.793)	**.33 (.013)**	.05 (0.724)	**.57 (.010)**	.20 (0.136)	1.00				
15 Motivation	5.25	1.92	-.13 (.330)	-.22 (.105)	**-.53 (<.001)**	.13 (0.328)	**.28 (0.039)**	-.16 (.252)	-.05 (.707)	.00 (.990)	.03 (.802)	-.21 (0.124)	-.16 (0.243)	**-.53 (<.001)**	-.22 (0.100)	**-.72 (<.001)**	1.00			
16 Velocity	1.12	0.77	-.14 (.288)	.14 (0.291)	.25 (0.066)	.13 (0.333)	.19 (0.171)	.20 (.139)	-.06 (.635)	-.09 (.508)	-.04 (.792)	-.04 (0.752)	-.08 (0.539)	.17 (0.215)	.18 (0.200)	.17 (0.208)	-.10 (0.460)	1.00		
17 Variation Velocity	1.85	0.42	-.04 (.752)	.17 (.220)	.25 (0.068)	.06 (0.664)	.11 (0.404)	.17 (.211)	-.06 (.660)	-.15 (.261)	.20 (.136)	.02 (0.885)	.08 (0.563)	.14 (0.317)	.23 (0.093)	.18 (0.187)	-.01 (0.932)	**.77 (<.001)**	1.00	
18 Intra-group Distance	9.69	3.31	.01 (.919)	-.05 (.738)	.03 (0.833)	.04 (0.778)	.19 (0.173)	-.11 (.437)	**-.29 (.029)**	-.24 (.080)	.24 (.075)	<.01 (0.982)	.08 (0.555)	-.06 (0.673)	.22 (0.111)	.05 (0.708)	.08 (0.578)	**.48 (<.001)**	**.57 (<.001)**	1.00

Note. P-values lower than .050 shown in **bold**.

Moles and Hostile Intent

Descriptives statistics were calculated and Mann-Whitney-U independent samples tests were conducted for the different sub samples such as the participants ($n_1 = 42$) and moles ($n_2 = 14$). This was conducted in line with the scope for the current study for variables Agreeableness, Fright, Anger, Joy, Contemplation of Hostile Intent and feelings of Hostile Intent during the games. An overview for these descriptives and test statistics can be found in table 3. Noteworthy results have been reported.

The Mann-Whitney U test showed that there were significant differences found between moles and participants on Contemplation of Hostile and Hostile Intent during both games. First, the test showed that there was a significant difference for Contemplation of Hostile intent in game 1 when it was a mole ($M_{R1} = 42.93$) than if it was a participant ($M_{R1} = 23.69$) with W_1 (995) = -3.86, p <.001). In the same game there was also a significant difference for Hostile intent when it was a mole ($M_{R1} = 45.39$) than if it was a participant ($M_{R1} = 22.87$) with W_1 = (961) = -4.67, p <.001). This result seems legitimate considering the nature of the role the mole had to play as saboteur in game 1 resulting in more thoughts and feelings about hostile intent. Second, the same relationship was tested with the same measure and variables, however for game 2. Results showed that there was a significant difference for Contemplation of Hostile intent in game 2 when it was a mole ($M_{R2} = 41.15$) than if it was a participant ($M_{R2} = 23.93$) with W_2 (1005) = -3.40, p = .001). The same game also illustrated that there was also a significant difference for Hostile Intent when it was a mole ($M_{R2} = 47.08$) than if it was a participant ($M_{R2} = 22.10$) with W_2 = (928) = -5.14, p <.001). Same explanation can be given here regarding the nature of the role the mole had to play. Hence, results are as expected and give evidence that the specific manipulation for moles worked accordingly and they felt more hostile towards other group members.

Table 3

Means and statistics for mole and participant comparisons in game 1 and 2 for agreeableness, relevant state variables and all GPS variables

Variable	Mean Mole (Participant)	SD Mole (Participant)	Mean Rank Mole (Participant)	W	Z	p
Agreeableness	5.71 (5.50)	.67 (.59)	33.29 (26.90)	1130	-1.271	.204
Game 1 Fright	3.39 (2.99)	1.62 (.91)	29.50 (28.17)	1183	-.266	.790
Game 2 Fright	3.54 (3.41)	1.55 (1.22)	29.61 (28.13)	1182	-.294	.769
Game 1 Anger	1.69 (1.61)	.91 (.78)	29.64 (28.12)	1181	-.310	.757
Game 2 Anger	1.84 (1.89)	1.06 (.99)	27.96 (28.68)	392	-.144	.885
Game 1 Joy	4.54 (4.86)	1.05 (1.21)	23.75 (30.08)	333	-1.263	.207
Game 2 Joy	4.43 (4.36)	1.69 (1.36)	28.93 (28.36)	1191	-.114	.909
Game 1 Contemplation of	4.50 (2.44)	1.56 (1.24)	42.93 (23.69)	995	-3.86	**<.001**
Hostile Intent	3.88 (2.34)	1.38 (1.08)	41.15 (23.93)	1005	-3.40	**.001**
Game 2 Contemplation of						
Hostile Intent						
Game 1 Hostile Intent	4.23 (1.65)	1.30 (1.09)	45.39 (22.87)	961	-4.76	**<.001**
Game 2 Hostile Intent	5.28 (1.76)	1.29 (1.22)	47.08 (22.10)	928	-.514	**<.001**
Game 1 Velocity	.67 (.87)	.37 (1.03)	25.93 (29.36)	363	-.681	.496
Game 2 Velocity	1.12 (.13)	.50 (.85)	31.43 (27.52)	1156	-.776	.438
Game 1 Variation Velocity	1.70 (1.67)	.40 (.33)	26.93 (29.02)	377	-.416	.677
Game 2 Variation Velocity	1.83 (1.91)	.39 (.43)	31.14 (27.62)	1160	-.700	.484
Game 1 Intra-Group	14.46 (15.06)	5.59 (6.75)	28.64 (28.45)	1195	-.038	.970
Distance	9.61 (9.71)	3.08 (3.41)	28.64 (28.45)	1195	-.038	.970
Game 2 Intra-group Distance						

Values for p in **bold** are significant at the .050 level.

Intra-group Distance Game 1 & 2 and Variation Velocity Game 2

Multiple linear regression analyses were performed for each game with trait and states as independent variables and GPS as dependent variables. More specifically, six regression models were created and tested which included all GPS variables from both games. Residuals were investigated for outliers more than three standard deviations away which were consecutively removed from further analysis. Also, residuals were checked if they were normally distributed and independent of prediction for all GPS outcome variables. An overview of all the tested regression models can be found in table 4 below.

However, only three models passed all assumptions and retained a parsimonious and significant regression line with significant predictors. These regression lines were Intra-Group

Distance game 1 (model 3), Variation Velocity game 2 (model 5) and Intra-Group Distance game 2 (model 6). Going forward, only these three models were reported. The statistical regression method used in SPSS was the stepwise method of adding and removing predictor variables per step based on statistical contribution to the regression model. In the same vein the methods forward and backward modelling were applied in chronological order if stepwise modelling failed in first place. Prerequisite for statistical regression methods was that the outcome variable with all predictors were explored first with enter method to gauge for outliers.

Table 4

Overview tested regression models with GPS variables as outcome variables and trait, states as predictors

Model	Independent variables	Dependent variable	Regression line R^2 (p)	Predictors regression line (p)	Model assumptions	Statistical regression modelling method	Iteration chosen model	Outlier
1	Trait, states game 1	Velocity game 1	.097 (.075)	Deception (**.031**) and Hostile Intent (.087)	Pass	Backward	14	Participant 3
2	Trait, states game 1	Variation Velocity game 1	.093 (.080)	Awareness Physical behaviour Change (.053) and Deception (.154)	Pass	Backward	14	NA
3	Trait, states game 1	Intra-Group Distance game 1	.166 (**.025)**	Agreeableness (**.023),** Group Cohesion **(.037**) and Situational Self Awareness (.096)	Pass	Backward	13	NA
4	Trait, states game 2	Velocity game 2	.084 (**.036**)	Deception (**.036**)	Fail	Stepwise	NA	Participant 3
5	Trait, states game 2	Variation Velocity game 2	.182 **(.040)**	Inclusion of Other in Self (**.048),** Anger (**.034**), Contemplation of Hostile Intent **(.030**) and Situational Self Awareness (.133)	Pass	Backward	12	NA
6	Trait, states game 2	Intra-Group Distance game 2	.252 (**.001**)	Fright (**.006**) and Situational Self Awareness (**.007**)	Pass	Stepwise	NA	Participant 2

Note. **Bold** values are significant at .the .050 level

Regression model 3: Intra-Group Distance game 1. Table 5 shows the calculated estimates and statistics for significant model 3: Agreeableness and Group Cohesion as predictors for Intra-Group Distances as outcome variable in game 1. The overall model fit is not that high but significant (R^2 = .166, p = .025).

Agreeableness was a significant and positive predictor for Intra-Group Distance in game 1 (Beta = .308, p =.023). This illustrated that participants who self-reported to be more agreeable had a greater distance from the other group members in game 1. A speculative explanation for this could be that these participants wanted to collaborate more and created more distance from each other in order to throw the ball more accurately and comfortably.

Additionally, Group Cohesion was a significant and negative predictor for Intra-Group Distance in game 1 (Beta = -.279, p = .037). Participants that reported to feel cohesive had a smaller distance between one another. This could be explained by the fact that some participants in game 1 felt more united as a group and therefore naturally came closer to each other. However, it must be noted that the immersion in the experiment and acquaintance between participants was not that full as in game 2. Therefore, as mentioned presumably not all participants and groups would share this feeling.

Table 5

Regression model 3: Intra-Group Distance game 1 – Statistics per estimate.

Overall model	R^2	p	
	.166	**.025**	
Predictor	Beta	SE	p
Agreeableness	.308	1.379	**.023**
Group Cohesion	-.279	.811	**.037**
Situational Self Awareness	-.220	.626	.096

Note. p-values less than .050 are **bold**.

Regression model 3: Variation Velocity game 2. Significant regression model 5 was calculated with Variation Velocity game 2 as outcome variable with Inclusion of Other in Self, Anger and Contemplation of Hostile Intent as predictors - which was shown in table 6 with estimates and statistics. Overall, the fit of the model was slightly higher than the previous model - still not very high, but significant (R^2 = .182, p =.040).

Inclusion of Other in Self was a significant and positive predictor of Variation Velocity in game 2 (Beta =.307, p = .048). Therefore, participants that felt more inclusive with other participants varied more in their speed in game 2. A reason for this could be that participants felt more connected with one another so they varied their speed more to be more collaborative towards each other. This would result in fast participants slowing down their pace and slower participants catching up, therefore increasing speed.

Furthermore, Anger was a significant and negative predictor for Variation Velocity in game 2 (Beta = -.318, p = 0.34). Thus, participants that had reported feelings of anger also had a smaller variation in their pace. A possible reason for this could be that participants felt

angry because of losing this game and the overall competition. Therefore, they stopped accelerating after their ball dropped from the pylon, unlike other participants that did accelerate after a drop in order to still be able to win.

Lastly, Contemplation of Hostile Intent was a significant and positive predictor for Variation Velocity in game 2 (Beta = .378, p = .030). This depicts that when participants had contemplated hostile intentions about other fellow participants then they also had more variation in their walking speed. This can be explained by the fact that in game 2 not every participants could see each other very well when walking with the pylon and ball on top. In that event, while having these thoughts participants sometimes walked faster to outpace the other, or to purposely slower, to sabotage the group's performance if they could not win for themselves. The latter could potentially be the mole.

Table 6
Regression model 5: Variation Velocity game 2 – Statistics per estimate.

Overall model	R^2	p	
	.182	**.040**	
Predictor	Beta	SE	p
Inclusion of Other in Self	.307	.039	**.048**
Anger	-.318	.061	**.034**
Contemplation of Hostile Intent	.378	.054	**.030**
Situational Self Awareness	.202	.039	.133

Note. p-values less than .050 are **bold**.

Regression model 6: Intra-Group Distance game 2. The model for Intra-Group Distance in game 2 was significantly calculated for predictors Fright and Situational Self

Awareness. The model in general had a better fit than the previous two models which is more common in social science research ($R^2 = .252$, $p = .001$).

To start with, Fright was a significant and negative predictor of Intra-Group Distance in game 2 (Beta = -.355, $p = .006$), which means that frightened participants had a smaller interpersonal distance between one another in this game. This result gave support for hypothesis Ia and was also backed up for the same relationship by the significant correlation flagged in the table for game 2. This can be clarified in terms of that frightened participants sought to be closer to one another in game 2 when carrying the pylons. This could make them feel better as they see, and learn how other participants are carrying the pylons in order to improve their own performance.

Finally, Situational Self Awareness was a significant and positive predictor of Intra-Group Distance in game 2 (Beta = .344, $p = .007$). Thus, indicating that participants who were aware of themselves during game 2 had a greater interpersonal distance between each other. An explanation for this could be that in game 2 participants had to focus on themselves in order to hold the pylons with the ball on top while maintaining speed. This speed differed per participant dependent upon their skills and consequently leading into greater distances between each participant.

Falsified hypotheses. Since only hypothesis Ia was supported by regression evidence but also by correlational results, therefore all the other hypotheses were rejected (Please consult the *hypotheses* section in chapter *Introduction* for all hypotheses) . In the first place, participants feeling of anxiety should led to a decreased velocity, which referred to hypothesis Ib, no evidence was found for this. A potential explanation be that that feelings of fright only decreased the intra-group distance (hypothesis Ia) between participants but it did not impact the velocity during the games. Secondly, hypothesis IIa was rejected that tested whether participants feeling of joy should led to a smaller velocity. In correlation table for game 1 only

evidence was found for this relationship but not in the regression analysis. A possible explanation for this could be that groups that had more fun were less competitive. These groups were also more focused on each other than the game itself and therefore walked less faster during the games. Third, participants feeling of anger should be related to a larger velocity, which referred to hypothesis IIb, was not supported. No evidence was found for this hypothesis. This could be explained by that participants feeling of anger was rather more related to the variation in velocity as discussed during the regression result but not to the measure of velocity itself. Last but not least, hypothesis III was rejected, that referred to participants low scores on agreeableness should be related to a larger velocity. No evidence was found for this hypothesis. An possible explanation for this could be that this trait did not was found for the increased velocity of participants but rather that only the intra-group distance would be increased instead as discussed during the regression results.

Discussion

The goal of the current research was to examine hostile intentions in individuals within groups in a manipulated competitive game setting. By doing so GPS data was related with survey data. First, the mole sub sample seemed to carry more hostile intent than the participant sub sample which was briefly touched upon and discussed. Last, for the total participant sample the intra-group distance for game 1 and 2 and, variation velocity in game 2 were reviewed. More specifically, that agreeableness and mental states impacted participants intra-group distance and variation of velocity either positively or negatively.

Hostile Intent

The field experiment showed that moles carried more hostile intent than other participants. Additionally, the experiment showed that trait and mental states associated with hostile intent had some relationships to movements of participants measured by GPS trackers.

Hostile intent in participants and moles. The correlational and non-parametric results gave cautious evidence for the differentiation in intended mole and participant manipulation for playing the games. The correlational results suggest a potential relationship for the total sample during both games that unmotivated participants were also deceptive and harboured hostile intentions. Therefore, these kind of participants could be potentially classified as the mole because they were unmotivated to get a good score for their themselves or the group. These moles instead sabotaged the group's performance by deceiving them and naturally carrying hostile intentions. Moreover, there was evidence that during both games of the field experiment the mole sub sample contemplated and felt more hostile intent than the participant sub sample. This means that the manipulation regarding moles worked since they were instructed to sabotage the group's performance. Their thought processes and actions were successfully influenced by the given instructions to engage subtly as the mole during the games. This means that participants with foul intentions could deliberately be manipulated and located in the current setting or any other setting. Indeed, this in turn means that possibly moles could be better induced into the game setting because they had a very specific task to execute next to playing the games which resulted in better immersion. On the contrary, obviously other participants did not had such task. However, since this was a non-parametric test the results were less powerful and should be interpreted with caution.

Agreeableness and Intra-Group Distance. Regression results show that agreeable participants had a greater distance to other participants in game 1. A reason for not finding this result in game 2 could be due to that all participants in general were closer to each other when playing the game. This effect has not been found in other research. However, other research did show that agreeableness has been associated with increased walking speed (Satchell et al., 2017). In current research this effect could not be replicated. A reason for this could be that in game 1 every participant had to walk at the same time and most likely with

the same speed to the next square. Therefore, no adequate distinguishment could be established between agreeable and non-agreeable participants in this sense.

Mental states and GPS variables. Mental states were found to be related to participant's intra-group distance in game 1 and variation in walking speed in game 2 by means of regression.

For instance, participants that experienced their group as cohesive had a smaller interpersonal distance to one another in game 1. A potential explanation for not finding this result in game 2 could be due to that participants walked closer together, but did feel less cohesion with the group. This explanation makes sense since there is more at stake in this game because this is the last game to be played for points in order to win the overall competition. In earlier and related research the relationship has not been found. However, past research does show that cohesiveness of small groups is to be understood as inter-group member attraction (Lott & Lott, 1965). In the same manner the current result could possibly be explained that cohesive participants felt more attracted to one another in terms of liking and open for collaboration. Due to this liking the interpersonal distance between participants was smaller. However, do note that it could also be that the interpersonal distance was smaller between participants and therefore the liking increased.

The previous found effect is similarly found for participants who felt frightened which resulted in walking closer to other participants, but in game 2 and was also supported by the correlational results in the same game. A reason for not finding this result in game 1 could be explained by that in game 1 participants were still getting accustomed to each other and to the competitive game setting. In game 2 everyone knew what was at stake and felt possibly more frightened due to the outside threat of losing the game and overall competition, therefore participants walked closer together. The finding were supported by past research (Brady & Walker, 1978; Feshbach & Feshbach, 1963; Schachter, 1959; Ziepert et al., submitted). In the

current study the effect of frightened participants walking slower was not found as in past research by Barliya et al., 2012. A reason for this could be that participants did not want to look suspicious by slowing down the group. Because if they did then they would be perceived by the other participants as the saboteur of the group. This in turn could lead to exclusion of collaborating with the rest of the group resulting in less points for this participant. In past research the slower pace was also considered as suspicious behaviour, however in a slightly different context, namely that participants would fear drawing attention of the guard participants in that experiment (Ziepert et al., submitted). Therefore, participants in that experiment did not walk slower.

In contrast with the previous found result in game 1, when participants were aware of themselves in game 2 then they had a greater interpersonal distance. An explanation for not finding this result in game 1 could be due to that in game 1 participants were more focused on the group than on themselves. However, this resulted in the same outcome but not due to focus on the self. No support in past research is found for this. Whereas in an analogy to related experiment, participants in the current experiment could have felt they were publicly scrutinized by the other participants and the research confederate while playing the game and interacting with each other (Worchel et al., 1986). This in turn would lead to more concern on being scrutinized and self-focus which results in a greater distance between the participant and the other participants.

Furthermore, participants who included the other in their self, varied more in their walking speed in game 2. This result was not found in game 1 and could be explained by that in game 1 participants in game 1 still had to be acquainted to each other and therefore less inclusion of the other in self, resulting in less variation. Also, the dynamics of game 1 were more static than game 2 where participants had to move more. No evidence was found for this effect in past research but in a study conducted by Webb, Rossignac-Milon, Tory Higgins

(2017) it was demonstrated that walking partners naturally adopt a cooperative walking style resulting in synchronous movement. In context of the current game this could mean that participants who felt included with the other participant, who felt the same, had more synchronous movements with each other. Because these participants had a cooperative style they had to sometimes wait for each other, slowing down pace and then excel speed again in order to walk together. In game 2 some participants dropped the ball from the pylon on the ground and therefore the other participants had to wait for them in order to help or advise. In the end, this results into more variation of these participants. On the contrary, participants who did not share the same feelings had less synchronous movement with the rest of the participants and maintained a constant pace in order to win the game.

Likewise in game 2, participants varied more in their walking speed when they had contemplated hostile intent. This result was not found in game 1 by reasoning that participants were not in the competitive game setting as much as in game 2 and therefore harboured less hostile thoughts. This indirectly resulted in less velocity variations. There was no direct evidence found in literature for this result. In related research conducted by Wijn et al., 2017 participants where, for example, induced to high cognitive load while carrying out a task. Framing this perspective to the current game, participants that contemplated hostile intent can be marked as a high cognitive load condition and the task as playing the game. Reason for this could be due to thinking about whether they looked suspicious or they had some to hide from the other participants while at the same time playing the game. Consequently, participants had to switch back and forth between these thoughts and executing the task in the game at the same time culminating into walking speed variations. The conditions, tasks and explanations just described would perfectly fit the role of the mole.

In contrast to the previously mentioned result of inclusion of other in self and contemplation of hostile intent in game 2, in the same game participants varied less in their

walking speed when they had angry feelings. A reason for not finding this result in game 1 could be that participants were not angry at all in game 1 since they were still getting acquainted. Therefore, no variations occurred due to participants not experiencing this mental state. While there is no direct evidence in historical literature for this result it is however, shown in literature that that anger is connected to a fast walking speed (Barliya et al., 2012; Gross et al., 2012). In the same study by Gross et al., 2012 it was also shown that individuals within an angry state dedicated a large percentage of the walking cycle to the swing phase of the legs. It was also evident that this swing phase was very swift but also constant as can be observed when angry individuals march ahead in this energetic state. From this it can be concluded that angry individuals hold a constant pace because of the state of emotion and large portion of the swing phase. In light of the current game it is explicated that participants that holstered angry feelings varied less in their pace because they wanted either to win and, remaining pace at a constant high or lose and, remaining pace at a constant low.

Synthesis

The results converge on that participants differ in hostile intent, intra-group distance and variation of velocity while playing the games. To start with, during both games unmotivated participants were more deceptive and hostile and these could potentially be marked as the mole. Second, moles carried more hostile intent than other participants during both games. Last, there were differences found for the relationships regarding trait, states and GPS variables in either game 1 or game 2. For the latter mentioned, it was important to note that only two effects were found for game 1 while the other five effects were found in game 2. On a more holistic level this can be explained by the fact that in game 1 participants still had to be acquainted with each other and were not that much immersed into the competitive game setting just yet. Since the relationships for the variables involved had an dependency upon this immersion therefore possibly more effects were found in game 2.

Game 1. Participants in general had a greater intra-group distance when they were agreeable or, smaller when they found their group as more cohesive. Groups with more agreeable participants would have greater distances in game 1 because of their willingness to cooperate effectively, especially to make the throwing of the ball easier in the first part of the game. On the other hand, it was argued that groups did not feel that united yet in game 1. The reason for this was that in game 1 participants still had to get acquainted with each other and also were not that immersed into the game setting and, thus at this point in time not that cohesive yet as a group. Therefore, it was put forward that most likely agreeableness contributed to intra-group distance and not group cohesion. At the same time, moles were better immersed already from the start in the game setting since they were manipulated to an extra extent. This extra extend refers to sabotaging and deceiving their group resulting in contemplating and harbouring more hostile intentions than other participants.

Game 2. Participants in general had differences in intra-group distance and variation in velocity. For instance, in game 2 frightened participants walked closer together and when they were more self-aware then participants walked farther apart. Putting this in the bigger picture it explains that in game 2 participants felt more pressurized to perform to win the game since it was also the last game to score any points for the competition. Therefore, resulting in frightened participants walking closer together. Self-focused participants would be busy with on how to win the game and competition and therefore walked farther apart. Besides the winning of the game and overall competition, this picture would suit moles more since they had a higher cognitive load. This cognitive load was hiding their true contemplation of hostile intent and hostile intent while at the same time playing the game. Therefore it would make more sense that it would be moles. However, the self-focus for participants and moles in game 2 remains ambiguous as in an universal explanation. Therefore, it was put forward that it was more likely that only fright led to a closer intra-group distance of participants. Moreover, this

result was also supported by regression results, but also by the correlational result.

Finally, participants varied more in their walking speed dependent upon whether they felt included with other participants and contemplated hostile intent or, varied less when they felt angry. It seemed probable that due to game 2 mechanics variations in walking speed naturally occur more than in game 1. However, it must be noted that probably the immersion in game 2 was stronger than in game 1 and therefore it is likely that participants felt more united with their fellow group members. For that same reason, moles probably also contemplated hostile intent and hostile intent even more than in game 1. Thus, it was argued that it seems less likely that anger would contribute to walking speed since correlational and regression results hold no support for this in game 2. Rather, it was stated that anger was related directly to the measure of velocity itself than to the indirect measure of variation in velocity. Therefore. it seems more likely that only contemplation of hostile intent and inclusion with other participants would contribute to variation in velocity. Since the nature of moles that tried sabotage their group's performance they naturally also thought about and felt more hostile intentions. Therefore, moles presumably also varied more in their walking speed.

Constraints

Several limitations were found from a methodological, analytical and theoretical point of view.

Methodological. Limitations regarding the setup of the field experiment were found pertaining to game 1 and 2. First, there were 14 rounds of experiments conducted however, only in the last round participants wore three GPS trackers instead of two. The results indicate that three trackers is better simply because three tracks were compared instead of two tracks for the most accurate track. Also, since it was a field experiment and not a lab experiment a nuanced approach as to cause and effect relationships have to be taken into account and was also accounted for the same. In addition, convenience sampling method was

used to gather participants for this study. Therefore, results were prone to volunteer bias (Trivedi & Sabini, 1998).

In addition, the degree to which experimental reality was induced can be questioned as well to some extent. This is due to the capabilities of the researcher of immersing participants into the competitive game environment of the experiment. For the research confederate it was not always that easy to facilitate the immersion of participants into the game setting which could have led to not the intended results. Also, the instructions were given most of the times exactly as intended, however for some groups this might have deviated a bit. This contributed in some cases less to the competitive game setting where participants should be in. For example, for participant 2 and 3 something possibly went wrong because they needed to be removed from statistical analyses as an outlier. Last, participants felt the need to perform because of the competitive game environment that could have led to counterproductive behaviours by some participants.

Distances were very short in game 1 and short in game 2 which could have led to inaccurate measures because of standard error in sensor measurements . Trackers not working well during games 1 and 2 due to distances being too short, thus not able to accurately measure. And some trackers failed and dropped out during the experiment.

Analysis. From an analytical point of view different tools and data could have been used. To start with, only GPS data segments of game 1 and game 2 were analysed now because of the scope of the current research. However, the whole GPS dataset included segments of participants tracks between game 1 and game 2 and, between game 2 and finish and, the entire field experiment track from start to end. These could all possibly be used for further analysis. In addition, differences between games were not analysed due to the scope of the current study. Secondly, the effects of the ratio of 1 mole per 3 participants resulting in 14 moles and 42 participants in total is an issue for analysis and non-parametric tests had to be

conducted which hold less statistical power. Especially, when comparing the moles and non-moles groups on different measures resulting in less statistical power for moles. Most of the times the mole sub samples did not meet the criteria for parametric tests while the participants sub sample in most cases did. Furthermore, questions that were removed in questionnaire for game 1 should also be removed in game 2 and vice versa to create a clearer reflection in further analyses and for later interpretation. Currently, this has not been done and a selection of questions were removed for each questionnaire specifically in order to increase the reliability. Finally, two regression models have been found significant in game 2 and only 1 in game 1. Differences between the setup and (chronological) order of the games might have influenced the statistical outcomes.

Also, some variables could not be used for the current study. For example, the variable leadership was not considered for analysis due to invalid data collection from participants. In the same vein, the GPS variable variation route deviation could not be used for current experiment, however they could be used for experiment by Ziepert et al., submitted. Reasoning behind this was that in the current study there was no fastest route defined as in past research by Ziepert et al, submitted. Additionally, it would be too complex to model this since the game segments differ substantially from the between segments in terms of use for this measure.

Finally, the use of a multilevel analysis within multiple linear regression would enrich the results as they currently were. This probably could be taken up in a follow-up study. For example, by taking into account the distinction of multiple levels such as the group as an extra a level when modelling the statistical estimates. This is needed because then the regression models could be tested for random effects for the extra level. Testing for random effects could contribute to extra statistical power and nuance because measurements for each participant and mole are not independent but depend on the group a mole or participant is in.

An example that illustrates this is a group with slow walking participants that could have influenced other participants to walk slower. In addition, not to mention the subtle influences moles could have had on participants and on the other hand, dominant participants on agreeable moles.

Theoretical. Differences from conceptualising theoretical concepts to operationalising constructs into the current field experiment could have led to other results. For example, the research setup by Wijn et al., 2017 was more artificial while the setup by Ziepert et al., submitted was more similar to the current research. If for example, the current experiment was slightly more controlled then it would converge in more conclusive results. More specifically, by creating equal games in terms of setup the constructs could be more and better measured resulting in better comparisons on a higher theoretical and conceptual level. As was evident to the current setup for both games the analyses were more in favour of game 2 than for game 1 in terms of results.

Moreover, the games in the current experiment facilitated participants to immerse into a competitive game setting in order to actually experience certain emotional states, especially game 2. However, it was argued that the facilitation of immersiveness of participants overall was better achieved in the experiment by Ziepert et al., (submitted) than the current one due to the guards and illegal cards setup. Therefore, it remains a trade-off between artificiality and experimental reality with their own theoretical consequences when designing such experiments.

Additionally, questionnaire items strategy, inclusion of other in self, deception and motivation comprised of only one item. All other constructs have multiple items for one construct. One can question the reliability and validity of constructs with only one item. Reasoning for this is that multiple items referring to the same construct are averaged resulting in a better estimation of that construct. Please not that a one item construct could already be

marked for removal in first instance or would not be reliable or valid at all. Therefore, this construct could then not be used for analysis.

Furthermore, in earlier research by Ziepert et al., (submitted) most results shed light on different variables than the current research. However, since the current study has its foundation in the previous mentioned study it is important to gage for support in results that are alike if possible. Therefore, from a theoretical point of view it can be concluded that fright and intra-group distance share the same results and therefore a small theoretical contribution is made in terms of validation.

To conclude with, the overall match was not perfect between the problem at hand mentioned in the introduction and the designed field experiment. However, since violent collectives consist of smaller groups it was still an adequate attempt. More specifically, because in the experiment small groups of four individuals were selected were one of them indeed harboured hostile intentions. Therefore, a small step is taken towards detecting hostile intentions of certain individuals in violent collectives.

Future steps

Future research could focus on analysing the segments between the games and their differences. For example, between game 1 and 2 segment and between game 2 and game 3 segment (debriefing point) could be analysed. When comparing the movement variables from the segment between game 1 and 2 with the state variables in game 1 one might draw interesting conclusions. This could be for example regarding the effect of the games on behavioural movement after the game when participants were more at ease and not in the competitive game setting. Last, differences between games were not analysed for now due to the scope of the current study. However, it would be interesting to gage how different variables would differ per game since they chronological follow each other up and could be considered as a repeated-measures design.

Furthermore, the leadership question could be further explored in to how this related to hostile intent in a competitive game setting. For example, the mole could naturally flow into the role of a leader in this setting or would it be perhaps one of the other participants in a group. In the end, it would be interesting to gage how hostile intentions would be affected if additional added segments, and differences between games as well as the leadership question would be taken into account in future research.

On a final note, also take into account that a certain sample size is desirable for subsequent statistical analyses as that from (Ziepert et al., submitted) which had in total around 150 participants divided over two experiments. Moreover, incorporating a multilevel analysis for the same while maintaining a well-balanced trade-off to facilitate immersion of participants into the game setting. For practical recommendations regarding the current study please check appendix 22.

Conclusion

The current research shed cautious light on that a self-reported trait or mental states underlying hostile intent could be related to GPS movement variables in groups within a manipulated and competitive field game setting. Deceptive individuals with deliberate foul intentions to sabotage the group's scores indeed contemplated and harboured hostile intentions more. This was as intended and resulted from the manipulated and competitive field game setting. For the variation in velocity the results were not unequivocal. Therefore, the main takeaway from this study was that interpersonal distances between individuals in such a setting differ. This differentiation was dependent upon when individuals feel anxious with their group resulting in less distance to each other. By contrast, larger distances to each other were more common to individuals that are agreeable. Needless to say, the current research explained more about the distances between individuals than other movement variables when occupying a certain trait or residing in certain psychological state in such a

setting. Moreover, since fright was the most adequately supported in this research as in past research it should therefore be the main one to be considered. In the end, a small step is taken towards detecting hostile intentions of certain individuals in mental states or possessing certain traits. These individuals are part of smaller groups which consecutively are part of larger violent collectives.

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Appendices

Overview appendices

Appendix 1 Who is the mole game description

The Mole television show is about that a group of Dutch celebrities partaking in a game where they can win money by collaborating together for the whole group which is stored in a group deposit. By collaborating together participants need to trust each other, however, a saboteur, also known as the Mole, tries to disrupt this collaboration subtly. After each episode all participants need to answer a questionnaire about the identity and activities of the Mole, subsequently he or she shall never have to go home if all questions are answered correctly. The participants that answers the most questions correctly in the last episode about the Mole and thus unmasks the Mole wins the deposit of money. The participant that knows the least questions is ruled out of the game and thus eliminated, except the Mole. However, this is not the case during the current field experiment because of experimental mortality.

Appendix 2 Informed consent form for Who is the Mole? Measuring Hostile Intent in Groups with GPS

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the field experiment	□	□
I have read and understood the study information dated [____/____/_____], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	□	□
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	□	□
I understand that taking part in the field experiment involves:	□	□
Participation in the field experiment where I will be wearing GPS-trackers that measure my location while playing games based upon the Who is the Mole television show that involves competitive play. In addition, I will fill in the questionnaires that are given before and in between the games in full and as honestly as I possibly can. The data that is gathered from me by the GPS-trackers and questionnaires are treated anonymously and will be stored safely according to the University of Twente GDPR legislation. Data is, in the same way, analysed and reported in the master thesis of the researcher.		
Risks associated with participating in the study		
I understand that taking part in the study involves the following risks:	□	□
That because of the competitive environment that is simulated by the games in the field experiment it is possible that participants could experience mental discomfort induced by the competitive environment and/or by other participants within the same group. However, this will be closely monitored by the researcher/witnesses in order to prevent such an outcome. In addition, when participant's experience this discomfort they can immediately withdraw at any moment during the field experiment.		
Use of the information in the study		
I understand that the information I provide will be used for:	□	□
For the master thesis of the researcher and is used to contribute to the scientific domain of the department Psychology in Conflict, Risk and Safety at the University of Twente.		
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	□	□
I agree that my information can be quoted in research outputs	□	□
Consent that my location is recorded by GPS trackers	□	□
Future use and reuse of the information by others		
I give permission for survey and GPS data that I provide to be anonymously archived in the database of the Department of Psychology in Conflict, Risk, and Safety of the University of Twente so it can be used for future research and learning. Anonymisation will be done by means of removing personal connections to participant numbers. Usage and access restrictions apply to the gathered data in the future excluding commercial use and maintaining fixed access as are maintained in the GDPR policies of Conflict, Risk and Safety.	□	□
I give the researchers permission to keep my contact information and to contact me for future research projects.	□	□
Signatures		

Signature participant:

Signature of the participant indicating that he or she has understood and consent to all the aforementioned.

Name of participant: Signature: Date:

_____ _____ _____

Signature researcher/witness:

I have witnessed the accurate reading of the consent form with the potential participant and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands what they are freely consenting.

Name of researcher/witness: Signature: Date:

_____ _____ _____

Study contact details for further information:

Carsten van Roon

j.h.c.vanroon@student.utwente.nl

+31 6 120 120 61

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-bms@utwente.nl

Appendix 3 Information sheet for Whole is the Mole? Measuring Hostile Intent in Groups with GPS

The present study delineates a field experiment wherein three competitive games will be played investigating the outlined theoretical concept of hostile intent and its hypothesized related mental states and personality traits. The purpose of this study is to distinguish hostile intent by means of relating GPS variables to mental states and personality traits. The practical relevance of this could be in monitoring of crowds/groups at festivals by means of location signals (e.g., GPS, WI-FI, etc.). By early detection of hostile intent authorities could be able to take earlier action and prevent negative outcomes (e.g., riots, fights, incidents).

Participants can benefit from the study by means of winning an incentive in the form of a smartwatch-fitness activity tracker worth approximately 50 euros. The participant (Mole or not Mole)that in the end has the highest score wins the competition. However, some participants could experience minor distress by means of the competitive game environment that is simulated. Participants will nonetheless be accordingly informed beforehand detailing that they can forfeit whenever they see fit. In between games, this will be stressed as well. In the end, a debriefing will be done which also implies an emotional/de-destress moment in which possible feelings that participants might hold are attenuated. Thus, multiple measures are taken in order to account for any burdens or risks that participants might endure while participating in this experiment. Finally, the current research project has been extensively reviewed and approved by the BMS Ethics Committee thus ensuring participants rights and safety within the experiment.

Participants can withdraw at any moment during the experiment whenever they feel like it with any explanation or justification. They will then be accordingly debriefed and if any (mental) discomfort is experienced this will be adequately addressed by the researcher.

Personal information that will be gathered from participants will be anonymised and thus further on processed in the same manner. Personal information that is gathered is the name and signature on the informed consent form and these will be anonymised in the data preparation phase of the study and further on. Participants can request access to and urge for rectification or erasure of personal data.

Data that is gathered in the field experiment such as GPS and survey data will be disconnected from personal connotations in the data preparation phase. Therefore, preserving confidentiality and de-identification of participants. Additionally, only controlled access to data is permitted within the regulations and legislation of the GDPR in relation to data archiving and reuse, manners of dissemination and possible publishing of the end report. Retention of research data will be as long as is required according to the rules of the GDPR.

Contact information is provided below in order for participants to address remaining questions about the research and participant's rights. Information can be requested from the Secretary of Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente to discuss any further concerns about the study with any other person than the researcher.

Contact details researcher:

Carsten van Roon

j.h.c.vanroon@student.utwente.nl

+31 6 120 120 61

Contact details BMS Ethics Committee:

ethicscommittee-bms@utwente.nl

Appendix 4 Description GPS tracker

The I-GotU GT-600 GPS tracker is used in the Who is the Mole experiment. The tracker, when turned on, receives a signal from GPS satellites in order to determine its own location. A GPS tracker as this one is used to determine in hindsight how the tracker has relocated itself from different locations. Thus, no live feed and by which makes it have a long battery life. It has an accuracy of approximately 5-20 meters deviation from the current location. It is small and easy to carry, is affordable and has a display. Additionally, in context of the current study, it is important that it creates a track in terms of longitude, latitude, and elevation in the data which can be visualised in programming languages such as R which carry libraries such as Psyosphere that can do this. Therefore, considering all the aforementioned makes the current tracker suitable for the current study.

Appendix 5 Leaderboard Who is the Mole

Leaderboard WITM Group number:	Score game 1 Part I	Score game 1 Part II	Score game 2 Part I	Score game 2 Part II	Score game 3	Total score

Appendix 6 Briefing & instructions

General instructions and briefing regular participant

Dear participant,

In this field experiment, you are classified as a regular participant. Your goal is to obtain as much Mollar for your group and for yourself in order to win the competition. You will do this by actively participating in the field experiment which consists of playing three games. The idea of playing these games is based upon the Who is the Mole television show (See information sheet Who is the Mole TV show). Try to actively collaborate with your fellow group members in order to make a good performance. You can earn money per group which is called Mollar in the current context. Also, consider that individual contribution to the group's performance is also measured per game and in between the games. Indeed, maybe, more importantly, your individual contribution to the group's performance during and in between the games will be measured in order to determine the best participant in the overall competition. The participant (Mole or not mole) that has obtained the highest score, in the end, will be crowned as the winner of the competition and will win a smartwatch worth of 50 euros. This can either be the Mole who sabotaged the best their group, or one of the other participants that has performed best individually and contributed best to their group's performance. After each game, all participants have to answer several questions about the Mole. The ones who answer the most questions correctly will score the most points. Vice versa the other way around. There will also be a prize for the best group and a consolation prize for the worst group (that has the best Mole) and worst Mole (the best group).

General instructions and briefing mole participant

Dear participant,

In this game, you are classified as a mole participant. Your goal is to disturb the performance of the group while covering the fact that you are actually the Mole. No one in the group may know that you are the Mole. The idea of playing these three games is based upon the Who is the Mole television show (See information sheet Who is the Mole TV show). Try to subtly sabotage the performance of one of your group members or your group as a whole. Also, consider that you can also make it look like that other group members are the Mole and not you. Your performance will be based upon how good you are able to cloak your Mole identity and are able to make others look like the Mole. If you are the best of all Moles you will able to win the competition. The participant (Mole or not mole) that has obtained the highest score, in the end, will be crowned as the winner of the competition and will win a smartwatch worth of 50 euros. This can either be the Mole who sabotaged the best their group, or one of the other participants that has performed best individually and contributed best to their group's performance. After each game, all participants have to answer several questions about the Mole. The ones who answer the most questions correctly will score the most points. Vice versa the other way around. As a Mole you will also answer these questions as well, however, you will not be scored by them of course because that’s part of the game. There will also be a prize for the best group (that has the worst Mole) and a consolation prize for the worst group (that has the best Mole) and worst Mole (that has the best group).

General instructions game 1 (orally instructed by the researcher) (duration game 1: 5 minutes)

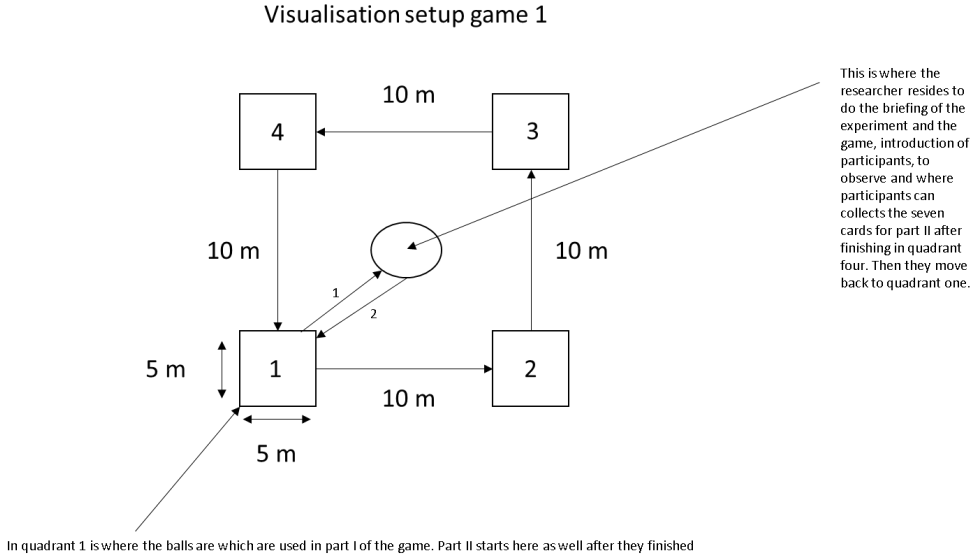
Part I

Dear participants,

First, it is up to you as a group to introduce yourself to one another and remember what everyone has said because this is going to be used in the first game. There are four quadrants spaced out 10 meters apart from each other marked as quadrant one to four as you can see on the visualization below. Based upon the introduction you have given to one another you have to play a throwing ball game. Whilst playing this game you will use a ball which you have to throw at one another while speaking out loud the participant's name and additionally mention something about the person that was mentioned in the introduction. Per four throws you can earn as a group 40 mollar (game money) provided that only correct information is mentioned about the other and, the ball does not fall on the ground. Another reinforcing condition is that after four throws in the first quadrant you all need to move as a group to the second quadrant because you can only earn mollar per four throws in one quadrant. Another issue to consider as the group is that whenever the ball doesn't drop in the first quadrant the group can consequently earn 80 mollar in quadrant two, 120 mollar in quadrant three and 160 mollar four. Thus, moving from quadrant one to four and then starting back over is obligatory. Try to move as fast as you possibly can as a group to earn as much mollar in order to win the overall competition as a group. When you have finished the first round which consists of finishing all four quadrants, then the second part of the game starts. However, beware of the Mole in your group that is trying to sabotage your group's performance.

Part II

Next, the group starts back again in quadrant one in order to start the second part of game 1 in which your group will receive seven coloured cards. You need to present an order of coloured cards by putting each member of your group in one quadrant and keeping the cards above your head. For example, quadrant one yellow, two red, three blue, four purple. The group member standing in quadrant one is counted as the first colour and the member standing in the last quadrant as the last colour. There are 15 different colour combinations possible according to the research confederates format. With your group you can earn 100 mollar for the first order, second 200 mollar third 300 mollar and so forth. However, you can only complete one order per round that you have completed as a group. After this, the cycle repeats and you have to start again with part I from game 1. However, beware, there is a Mole amongst your group trying to sabotage the group's performance! Try to reach the best score with your group of all the other groups.



Instructions participant game 1 (orally instructed by the researcher)

Dear participant,

As a participant in game 1, you need to ensure that you will score as many points for the group. When doing this you will be evaluated and scored individually as well by how much you contribute to the group's performance. You need to gain as many points individually as well to win the smartwatch and to be crowned as the best participant in the competition. Try to find out at the same time who is the Mole in your group. You will get scored for this as well. However, do this subtly, else you lose points. Your role in game 1 is to earn as much Mollar as you can for the group in the first and second part of the game. In the first part try to contribute as much as you can to the group performance by actively trying to remember information from your fellow group members. Therefore, try to get to really know each other within this game. Additionally, try to speed up the pace in which the ball is thrown and encourage your fellow group members to move as fast as possible. However, not too fast because then the ball might drop too much and you will not score as many Mollar. In the second part of the game try to remember the card configurations you have already used in previous rounds in order to gain as much Mollar as you can. In addition, try to find out who possibly could be the Mole, because this person hinders your performance and your group as a whole! You will be scored upon all the aforementioned individual as group wise. Try to get the best score for yourself as well as for the group!

Instructions mole game 1 (orally instructed by the researcher)

Dear participant,

As the Mole, it is your task to sabotage the group performance in terms of subtly letting the ball drop in the first part and by passing through timely wrong information about someone else. Try to slow down the group as well in moving from one quadrant to another. However, beware to not cause to much suspicion about yourself. In the second game try to cause confusion in the orders of cards used in the second part and try to slow down progress as much as you can. However, once again do this subtly. Remember, as a Mole you will be scored amongst all other moles in order be the best mole, or the worst. Things to consider when scoring points as a Mole is that you need to be as subtle as you can in disguising your true intentions as the Mole in not letting your fellow group members know you are actually the Mole. You will be scored also on all the aforementioned. Try to get the best score for yourself!

General instructions game 2 (orally instructed by the researcher) (duration game 2: 5 minute)

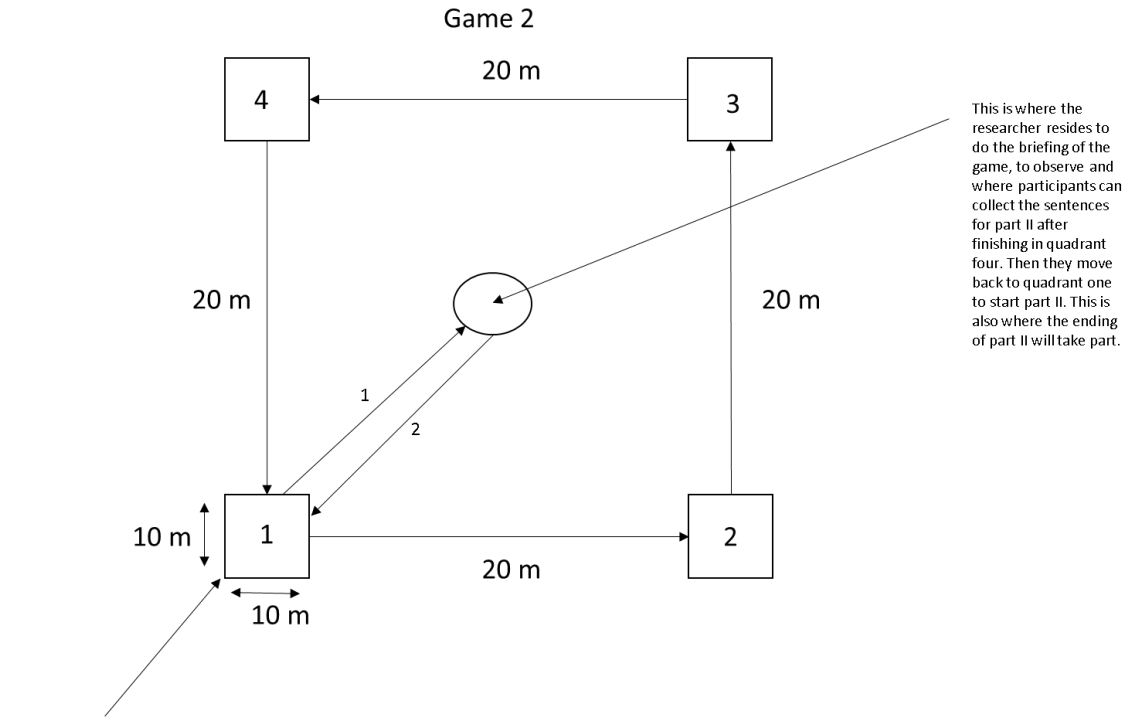
Part I

Dear participants,

The second game consists also of two parts and is about that each member of your group moves four pylons with balls on top of them and additionally, you have to move together as a group. However, in the current game, the quadrants are spaced out 20 meters from each other (see visualisation below). Thus, you need to move twice as far in comparison with game 1. Furthermore, you all need to move all four pylons from one quadrant to another at the same time altogether putting them on the ground. When you do this you earn mollar. Keep in mind, however, that you need to keep the ball on top of the pylon while doing this. One of the conditions is that if the ball falls on the ground from one of the group members you all have to start over in the quadrant you just started. Moreover, when the ball does fall on the ground your group will receive a penalty of minus 50 mollar. Same rules as in game 1 apply considering moving from quadrant one to four in chronological order. Try to move as fast as you can as the group in order to score as many points as you can with your group. You can earn 100 mollar per quadrant reached as the group in whole.

Part II

The second part of the game starts when your group reaches quadrant one again. One of your group will receive a sentence written on a piece of paper. This sentence belongs to one of two stories however, completely randomized. The faster your group completes a round the more sentences you as a group can gather. When the game is finished your group must guess what the stories are about. You only have one chance and it must be written on the given piece of paper. You have one minute for this. What makes it more interesting is that per correct story your group can gain 250 mollar and, for the both of them correct, 750 mollar in total. This second part is once again dependent upon the first part just like in game 1. However, the importance of monetary value gained in this game is much higher. Thus, it is important for your group to do well in this game because more is at stake! Do your best!



Instructions participant game 2 (orally instructed by the researcher)

Dear participant,

In game 2 it is your goal to score as many Mollar as you can by contributing to the group's performance. This performance is based upon your own individual contribution. At the same time, your individual contribution will be waged as well in terms of being flawless and swift in moving pylons with the ball, encouraging group members and actively contributing to guessing the stories. Try to move the pylons with the balls as fast as you can in part 1 and encourage your fellow group members to do the same in synchrony. Try to find out who is the Mole in your group! But do this subtly, because you will be scored by this. Try to get the best score for yourself as well as for the group!

Instructions mole game 2 (orally instructed by the researcher)

Dear participant,

As the Mole, it is your task to slow down progress in part 1 with the pylons and balls and in part 2 cause confusion in guessing the stories. However, be cautious when doing this because others might see through you as in being the Mole! Try to make others look like they are the Mole instead of you in order to draw attention away from you. Still, reach your goals and remain undetected. All these things will score points for you as the Mole, so be careful. Try to get the best score for yourself!

Appendix 7 Questionnaire I & **c**odebook

Who is the mole before-games Questionnaire Field Experiment

The questions you are about to answer are of demographical nature and as well to personality traits of individuals. You only have to answer these questions once at this moment **before** the first game. Do not think too long about your answers; because we are interested in your first impressions. Please answer **all** questions, and do so without consulting your fellow students and group members. Please write down your **GPS tracker(s) number(s), participant number and group number** below here at question 1. Please be **accurate** when writing down tracker, participant or group numbers. Your data will be treated confidentially, will be processed and analyzed anonymously, and cannot be traced back to you when reported.

Please fill out all questions, and be accurate when you are asked to write down tracker(s), participant and group numbers. Write legibly [*Du: leesbaar*].

1. What is the number of your **GPS tracker(s)** (see on the back of the tracker), your **participant** number and your **group** number? Write all three numbers down in the box below.

GPS: Participant: Group:

2. Are you the Mole?

☐ Yes ☐ No

Please indicate the extent to which the following attributes apply to you:

3. Trusting	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
4. Well-meaning	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
5. Friendly	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
6. Helpful	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
7. Good-natured	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
8. Obstinate	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
9. Quarrelsome	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
10. Hostile	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
11. Hard-hearted	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
12. Resentful	Not at all	☐	☐	☐	☐	☐	☐	☐	Very much

13. What is your gender?

☐Male ☐ Female

14. What is your age?

15. What is your nationality?

☐ Dutch ☐ German ☐ Other: ...

- This was the final question of the questionnaire **before** the first game; thank you! -

Who is the mole before-games Questionnaire Field Experiment Codebook

The questions you are about to answer are of demographical nature and as well to personality traits of individuals. You only have to answer these questions once at this moment **before** the first game. Do not think too long about your answers; because we are interested in your first impressions. Please answer **all** questions, and do so without consulting your fellow students and group members. Please write down your **GPS tracker(s) number(s), participant number and group number** below here at question 1. Please be **accurate** when writing down tracker, participant or group numbers. Your data will be treated confidentially, will be processed and analyzed anonymously, and cannot be traced back to you when reported.

Please fill out all questions, and be accurate when you are asked to write down tracker(s), participant and group numbers. Write legibly [*Du: leesbaar*].

QB = Questionnaire Before QD1 = Questionnaire During Game 1 QD2 = Questionnaire During Game 2
Example : QBD1D2Q1 = Question found in: Questionnaire Before and During Game 1 and During Game 2 Question 1

1. What are the numbers of your **GPS trackers** (see on the back of the trackers), your **participant** number and your **group** number? Write all three numbers down in the box below. . **[Three variable names: GPS_QBD1D2Q1 – Participant_ QBD1D2Q1 - Group_ QBD1D2Q1]**

GPS: Participant: Group:

2.Are you the Mole? **[Mole_ QBQ2_QD12Q3]**

1 Yes 2 No

Agreeableness (A)

Please indicate the extent to which the following attributes apply to you:

3. Trusting [**A1_QBQ3**]	Not at all	1	2	3	4	5	6	7	Very much
4. Well-meaning **[A2_QBQ4]**	Not at all	1	2	3	4	5	6	7	Very much
5. Friendly **[A3_QBQ5]**	Not at all	1	2	3	4	5	6	7	Very much
6. Helpful **[A4_QBQ6]**	Not at all	1	2	3	4	5	6	7	Very much
7. Good-natured **[A5_QBQ7]**	Not at all	1	2	3	4	5	6	7	Very much
8. Obstinate [**A6_QBQ8**]	Not at all	1	2	3	4	5	6	7	Very much
9. Quarrelsome **[A7_QBQ9]**	Not at all	1	2	3	4	5	6	7	Very much
10. Hostile **[A8_QBQ10]**	Not at all	1	2	3	4	5	6	7	Very much
11. Hard-hearted **[A9_QBQ11]**	Not at all	1	2	3	4	5	6	7	Very much
12. Resentful **[A10_QBQ12]**	Not at all	1	2	3	4	5	6	7	Very much

13. What is your gender? **[Gender_QBQ13]**

1 Male 2 Female

14. What is your age? **[Age_QBQ14]**

15. What is your nationality? **[Nationality_QBQ15]**

1 Dutch 2 German 3 Other: ...

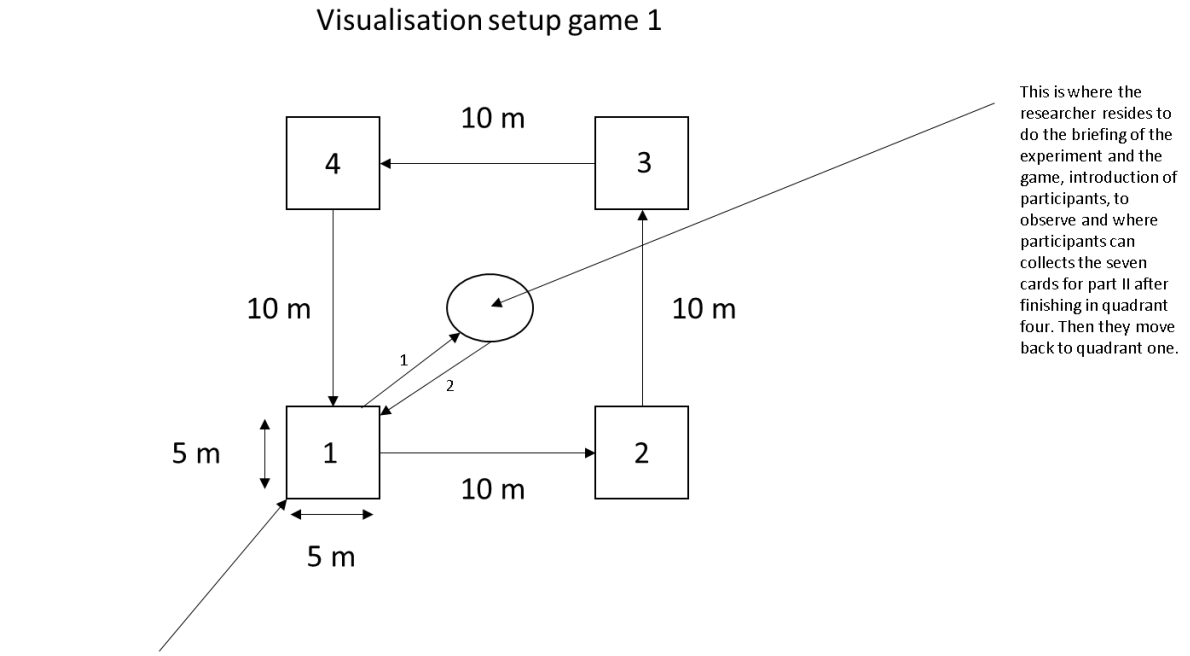
- This was the final question of the questionnaire **before** the first game; thank you! -

Appendix 8 Explanation and elaboration of game 1: ball & cards game

Participants were asked to play the first game which was a throwing ball and cards game (View appendix 6 for game 1 specific instructions). This game served its purpose in order to get acquainted with each other to create feelings of being a group and build feelings of mutual trust and cohesiveness (Boyes & French, 2009). Instructions were given orally at location 1 (See figure 2) and were also written on one page and could be found in appendix 6. See figure 4 below for visualisation of game 1. The function of this game was to familiarize group members with each other in terms of feeling as one group by virtue of a mutual goal. Furthermore, this helped to kickstart the engagement of competitive behaviour among the group and at the same time feeling the pressure that there was someone trying to sabotage the group's performance.

Figure 4

Overview Setup Game 1



In the first part of the game, everyone introduced themselves briefly and they had to come up with a group name that was enlisted on the leader scoreboard. The confederate wrote this down on the leader scoreboard. Next, the group walked to the first quadrant of in total four quadrants which were all 10 meters apart marked by the confederate (see figure 4). The quadrants self were 5 by 5 meters. Next, they had to throw one ball to one another while speaking out loud the other participants name and additionally, another characteristic about him or her that was mentioned in the introduction. Additionally, the group could earn 40 Mollar per four throws, on condition that, only correct information was mentioned about the other and that the ball did not fall on the ground. Another condition was that, after four throws, they needed to move to the other quadrant because you could only earn money per four throws in one quadrant. If the ball did not drop in the first quadrant, then in the second quadrant the group could earn 80 mollar, third 120 mollar and the last quadrant 160 mollar. Therefore, moving on to quadrant two, three and four in this order and then starting back at quadrant one was then obligatory. However, the assigned mole tried to subtly sabotage the game by letting the ball drop, putting forward incorrect information, or by not timely moving to the other quadrant.

The second part of the game started when they had finished the first round (finishing all four quadrants) and subsequently the group received seven coloured cards when they were back in the first quadrant (See figure 4). Next, participants needed to keep the cards above their heads in order to present an order of colours in each of the quadrants. For instance, quadrant one yellow, two red, three orange and four black. The purpose of this part of the game was that the groups had to create as many different colour combinations according to the confederates answer format. At the same time they had to communicate and collaborate effectively with each other in order to keep track of which orders had passed and which not. However, they had to present an order of colours by means of each participant in one of the quadrants (quadrant one to four). The individual that stood in the first quadrant was counted as the first colour and the one on the last quadrant as the last. In confederates answer format, there were 15 different colour combinations possible (Consult appendix 8). The confederate kept track of time and money for each group to ensure that the game was played according to the rules. For the first order they could receive 100 mollar, second 200 mollar, third 300 mollar and so forth (See appendix 9 for scoring and rules criteria). But, they could only create one order per round that they completed. Thus, participants had to start again first in the first quadrant and start with the first part of game. The mole would accordingly try to sabotage the game in terms of confusing the orders that had already been scored. Another strategy the mole could apply was by distorting the communication between group members resulting in delay of the team progression and therefore less amount of money could be earned. After the game participants filled in the questionnaire detailing the researched variables and questions about the mole (See appendix 10 for questionnaire II and appendix 11 mole questions). They then handed the questionnaire in and they moved to the second and last game. Finally, the group was scored.

Appendix 9 Scoring and rule criteria games

Game 1
Scoring &rules criteria:
Part I:
Per four throws 40 Mollar
Only mention correct information
Everyone must be able to hear this
After four throws move to next quadrant
Quadrant order one to four (chronological)
Ball may not fall on the ground
Without the ball dropping: 2nd quadrant: 80 Mollar 3th quadrant: 120 Mollar 4th quadrant: 160 Mollar After first round this resets again.
Collect cards at the researcher in the middle circle
Part II:
Seven coloured cards and start in Q1.
Present order of colours per group member in a quadrant
Same quadrant order as in game 1
Participant in quadrant one as the first of the order
Create as many different colour combinations as you can come up with
First order 100 Mollar Second order 200 Mollar Etc.
Only one order per round completed
Then start with **part I** again

Game 2
Scoring criteria:
Part I:
Move four pylons with balls on top of them with each participant individually to next quadrant altogether at the same time
If ball falls from pylon on the ground then start over again in the quadrant you just started
Penalty if balls fall on the ground: -50 Mollar
Same rules as in game one when moving from quadrant order
Group can earn 100 Mollar per subsequent quadrant reached with every group member
Ends when quadrant one is reached again
Collect sentence at researcher at Q1.
Part II:
Starts in quadrant one
Group receives a piece of paper with a sentence one it which is randomized belong to one of two stories in the middle at the researcher
Gather as much sentences as you can as a group
At the end guess the two stories and write this down on a piece of paper
First story correct 250 Mollar
Both stories correct 750 Mollar

Appendix 10 Colour combinations cards game

Use format 1 primarily

Format 1:

1. 1) Light blue, 2) Pink, 3) Blue, 4) Yellow
2. 1) Lilac, 2), Red 3), Yellow 4) Blue
3. 1) Light green, 2) Pink, 3) Red, 4) Lilac
4. 1) Blue, 2) Yellow, 3) Lilac, 4) Light green
5. 1) Red, 2) Light blue, 3) Yellow, 4) Pink
6. 1) Yellow, 2) Blue, 3) Lilac, 4) Light blue
7. 1) Light green, 2) Lilac, 3) Blue, 4) Red
8. 1) Red, 2) Pink, 3) Blue, 4) Light blue
9. 1) Light blue, 2) Light green, 3) Yellow, 4) Blue
10. 1) Blue, 2) Red, 3) Yellow, 4) Pink
11. 1) Yellow, 2) Blue, 3) Light green, 4) Lilac
12. 1) Light green, 2) Lilac, 3) Pink, 4) Red
13. 1) Light blue, 2) Yellow, 3) Red, 4) Light green
14. 1) Blue, 2) Light blue, 3) Pink, 4) Red
15. 1) Yellow, 2) Pink, 3) Lilac, 4) Blue

Format 2:

1. 1) Red, 2) Pink, 3) Blue, 4) Light blue
2. 1) Light blue, 2) Light green, 3) Yellow, 4) Blue
3. 1) Blue, 2) Red, 3) Yellow, 4) Pink
4. 1) Yellow, 2) Blue, 3) Light green, 4) Lilac
5. 1) Light green, 2) Lilac, 3) Pink, 4) Red
6. 1) Light blue, 2) Yellow, 3) Red, 4) Light green
7. 1) Blue, 2) Light blue, 3) Pink, 4) Red
8. 1) Yellow, 2) Pink, 3) Lilac, 4) Blue
9. 1) Light blue, 2) Pink, 3) Blue, 4) Yellow
10. 1) Lilac, 2), Red 3), Yellow 4) Blue
11. 1) Light green, 2) Pink, 3) Red, 4) Lilac
12. 1) Blue, 2) Yellow, 3) Lilac, 4) Light green
13. 1) Red, 2) Light blue, 3) Yellow, 4) Pink
14. 1) Yellow, 2) Blue, 3) Lilac, 4) Light blue
15. 1) Light green, 2) Lilac, 3) Blue, 4) Red

Appendix 1**1** Questionnaire II & **c**odebook

Who is the mole during-game Questionnaire Field Experiment Questionnaire

Game 1 **Game 2**

The questions you are asked to answer below are about your experiences in the **game** you have **just completed**.
Please read the instructions and questions carefully. Do not think too long about your answers; we are interested in your first impressions. Please answer **all** questions, and do so without consulting your fellow students and group members. Please write down your **GPS tracker(s) number(s), participant number and group number** at question 1 below here. Please be **accurate** when writing down tracker(s), participant and group numbers. Your data will be treated confidentially, will be processed and analyzed anonymously, and cannot be traced back to you when reported.

Please fill out all questions, and be accurate when asked to write down tracker(s), participant and group numbers. Write legibly [*Du: leesbaar*].

16. What is the number of your **GPS tracker(s)** (see on the back of the tracker), your **participant** number and your **group** number? Write all three numbers down in the box below.

GPS: Participant: Group:

17. Which game of the field experiment have you just completed?

☐ 1st game ☐ 2nd game ☐ 3rd game

18. Where you the Mole?

☐ Yes ☐ No

19. To what extent did you want your group members to think you were the mole?

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

20. To what extent did you try to deceive your group members?

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

21. Below you see two rows of squares. In the **top row** (a.) you write down which group member you are referring to by means of writing down his participant number in that particular box. Then in the **bottom row** (b.); please **indicate how much leadership each of your group members have shown** in line with the participant number you filled in the box above *during the game* which you do so by using an index; with 1 indicating the strongest leader, 2 meaning second-strongest leader, etc. Use equal numbers for group members who have shown leadership equally, but please **use index 1 (strongest leader) and the lowest index (most weak group member) only once.**

a. Participant number *(from each of your group member per box):*							
b. Leadership index: *(1=strongest, 2=second-strongest, …)*							

Below you will find a number of statements about experiences and feelings you may have had ***during*** this game. Please indicate your agreement with each of the statements below.

During this game:

22. There is much trust between group members
Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

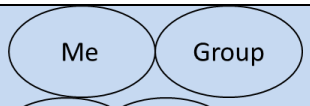
23. The group members work together as a group
Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

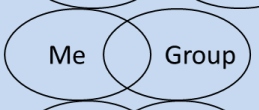
24. My group members know that they can count on each other
Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

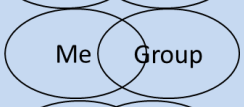
25. My group members stand up for each other
Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

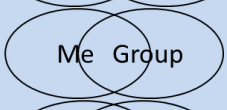
26. My group members see each other as friends
Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

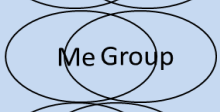
Put a mark at the box that resembles the best your relation with the group **during** this game. There are no wrong answers.

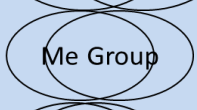
27. ☐ 

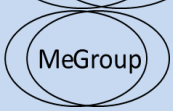
28. ☐ 

29. ☐ 

30. ☐ 

31. ☐ 

32. ☐ 

33. ☐ 

During this game:

34. I had the feeling the other group members targeted me

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

35. I thought I had attracted the other group members attention

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

36. I had a feeling that I was going to be stopped by other group members

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

37. I felt like I was the one being addressed by the other group members

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

38. I had the idea that the group members were paying attention to me

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

During this game:

39. I was jumpy

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

40. I felt stressed

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

41. I felt tense

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

42. I felt watched

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

43. I felt I was suspect

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

During this game:

44. I felt angry

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

45. I was mad

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

46. I was resentful

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

47. I was grouchy

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

48. I was irritated

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

49. I was frustrated

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

During this game:

50. I felt happy

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

51. I felt satisfied

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

52. I felt content

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

53. I felt cheerful

Not at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very much

During this game:								
54. I have tried to hide my tension								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
55. I have tried to hide my nerves								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
56. I have tried to hide my emotions								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
57. I have tried not to attract attention								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
58. I have tried to act as normal as possible								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
59. I have *changed* my pace a lot								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
60. I have *decreased* my pace a lot								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
61. I have *increased* my pace a lot								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
62. I tried to stay close to other group members								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
During this game:								
63. I was wondering whether I looked suspicious to the other group members								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
64. I would rather have not played this game with this group								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
65. I was thinking about what I had to hide from the other group members								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
66. I was wondering whether I was doing something that I was not allowed to do								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much

During this game:								
67. I was aware of everything in my direct surroundings								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
68. I was aware of my inner feelings								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
69. I was aware of the way I presented myself								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
70. I was aware of how I looked								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much

During this game**:**								
71. I was motivated to make my group perform worse								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
72. I felt I was doing something on purpose to hinder group performance								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
73. I felt I had hostile intentions								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much
During this game:								
74. I was motivated to obtain a good score in this game								
Not at all	☐	☐	☐	☐	☐	☐	☐	Very much

- This was the final question of the questionnaire for **this** game; thank you! -

Who is the mole during-game Questionnaire Field Experiment Questionnaire Codebook

Game 1 **Game 2**

The questions you are asked to answer below are about your experiences in the **game** you have **just completed**.
Please read the instructions and questions carefully. Do not think too long about your answers; we are interested in your first impressions. Please answer **all** questions, and do so without consulting your fellow students and group members. Please write down your **GPS tracker(s) number(s), participant number and group number** below at question 1. Please be **accurate** when writing down tracker(s), participant and group numbers. Your data will be treated confidentially, will be processed and analyzed anonymously, and cannot be traced back to you when reported.

Please fill out all questions, and be accurate when asked to write down tracker or participant numbers. Write legibly [*Du: leesbaar*].

QB = Questionnaire Before QD1 = Questionnaire During Game 1 QD2 = Questionnaire During Game 2
QD12Q3 = Questionnaire During game 1 and During Game 2 Question 3

Example : QBD12Q1 = Question found in: Questionnaire Before and During Game 1 and During Game 2 Question 1

1. What are the numbers of your **GPS trackers** (see on the back of the trackers), your **participant** number and your **group** number? Write all three numbers down in the box below. **[Three variable names: GPS_QBD12Q1 – Participant_ QBD12Q1 - Group_ QBD12Q1]**

GPS: Participant: Group:

2. Which game of the field experiment have you just completed? **[Game_QD12Q2]**

1 1st game 2 2nd game 3 3rd game

3. Are you the Mole? **[Mole_ QBQ2_QD12Q3]**

1 Yes 2 No

4. To what extent did you want your group members to think you were the mole? **[Strategy_QD12Q4]**

Not at all 1 2 3 4 5 6 7 Very much

5. To what extent did you try to deceive your group members? **[Deception_QD12Q5]**

Not at all 1 2 3 4 5 6 7 Very much

6. Below you see two rows of squares. In the **top row** (a.) you write down which group member you are referring to by means of writing down his participant number in that particular box. Then In the **bottom row** (b.); please **indicate how much leadership each of your group members has shown** in line with the participant number you filled in the box above *during the game* which you do so by using an index; with 1 indicating the strongest leader, 2 meaning second-strongest leader, etc. Use equal numbers for group members who have shown leadership equally, but please **use index 1 (strongest leader) and the lowest index (most weak group member) only once.**

[Leadership_QD12Q6]

a. Participant number **[Participant number 1, Participant number 2, …, Participant number 80]**

b. Leadership index *(1=strongest, 2=second-strongest, ...)* **[LSPN1, LSPN2, … LSPN80]** ***LSPN^x= Leaderscoreparticipantnumber^x***

Below you will find a number of statements about experiences and feelings you may have had ***during*** this game. Please indicate your agreement with each statement.

Group Cohesion (GCQD12)
During this game:

7. There is much trust between group members [**GC1_QD12Q7**]

Not at all 1 2 3 4 5 6 7 Very much

8. The group members work together as a group**[GC2_QD12Q8]**

Not at all 1 2 3 4 5 6 7 Very much

9. My group members know that they can count on each other **[GC3_QD12Q9]**

Not at all 1 2 3 4 5 6 7 Very much

10. My group members stand up for each other**[GC4_QD12Q10]**

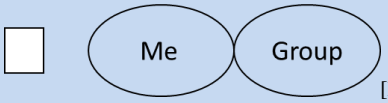
Not at all 1 2 3 4 5 6 7 Very much

11. My group members see each other as friends **[GC5_QD12Q11]**

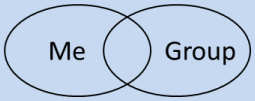
Not at all 1 2 3 4 5 6 7 Very much

Inclusion of Self Scale – Identification with the group

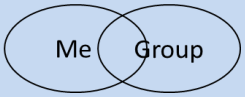
Put a mark at the box that resembles the best your relation with the group **during** this game. There are no wrong answers. **[IOSS_QD12Q12-18)**

12. 

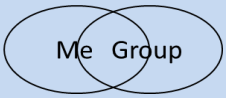
[**IOSS1**]

13. 

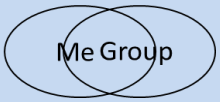
[IOSS 2]

14. 

[IOSS 3]

15. 

[IOSS 4]

16. 

[IOSS 5]

17. 

[IOSS 6]

18. 

[IOSS 7]

Self as Target [SAT_QD12]

During this game:

19. I had the feeling the other group members targeted me **[SAT1_QD12Q19]**

Not at all 1 2 3 4 5 6 7 Very much

20. I thought I had attracted the other group members attention**[SAT1_QD12Q20]**

Not at all 1 2 3 4 5 6 7 Very much

21. I had a feeling that I was going to be stopped by other group members **[SAT2_QD12Q21]**

Not at all 1 2 3 4 5 6 7 Very much

22. I felt like I was the one being addressed by the other group members **[SAT3_QD12Q22]**

Not at all 1 2 3 4 5 6 7 Very much

23. I had the idea that the group members were paying attention to me **[SAT3_QD12Q23]**

Not at all 1 2 3 4 5 6 7 Very much

Fright [FRIGHT_QD12]

During this game:

24. I was jumpy **[FRIGHT1_QD12Q24]**

Not at all 1 2 3 4 5 6 7 Very much

25. I felt stressed **[FRIGHT2_QD12Q25]**

Not at all 1 2 3 4 5 6 7 Very much

26. I felt tense **[FRIGHT3_QD12Q26]**

Not at all 1 2 3 4 5 6 7 Very much

27. I felt watched **[FRIGHT4_QD12Q27]**

Not at all	1	2	3	4	5	6	7	Very much

28. I felt I was suspect **[FRIGHT5_QD12Q28]**

Not at all	1	2	3	4	5	6	7	Very much

Anger [ANGER_D12]
During this game:

29. I felt angry **[ANGER1_QD12Q29]**

Not at all	1	2	3	4	5	6	7	Very much

30. I was mad **[ANGER2_QD12Q30]**

Not at all	1	2	3	4	5	6	7	Very much

31. I was resentful **[ANGER3_QD12Q31]**

Not at all	1	2	3	4	5	6	7	Very much

32. I was grouchy **[ANGER4_QD12Q32]**

Not at all	1	2	3	4	5	6	7	Very much

33. I was irritated **[ANGER5_QD12Q33]**

Not at all	1	2	3	4	5	6	7	Very much

34. I was frustrated **[ANGER6_QD12Q34]**

Not at all	1	2	3	4	5	6	7	Q

Joy [JOY_QD12]
During this game:

35. I felt happy **[JOY1_QD12Q35]**

Not at all	1	2	3	4	5	6	7	Very much

36. I felt satisfied **[JOY2_QD12Q36]**

Not at all	1	2	3	4	5	6	7	Very much

37. I felt content **[JOY3_QD12Q37]**

Not at all	1	2	3	4	5	6	7	Very much

38. I felt cheerful **[JOY4_QD12Q38]**

Not at all	1	2	3	4	5	6	7	Very much

Awareness [AWCP_QD12] (*AwC = Cognitive behavior change, AwP = Physical behavior change)*

During this game:

39. I have tried to hide my tension **[AWC1_QD12Q39]**

Not at all	1	2	3	4	5	6	7	Very much

40. I have tried to hide my nerves **[AWC2_QD12Q40]**

Not at all	1	2	3	4	5	6	7	Very much

41. I have tried to hide my emotions **[AWC3_QD12Q41]**

Not at all	1	2	3	4	5	6	7	Very much

42. I have tried not to attract attention **[AWC4_QD12Q42]**

Not at all	1	2	3	4	5	6	7	Very much

43. I have tried to act as normal as possible **[AWC5_QD12Q43]**

Not at all	1	2	3	4	5	6	7	Very much

44. I have *changed* my pace a lot**[AWP1_QD12Q44]**

Not at all	1	2	3	4	5	6	7	Very much

45. I have *decreased* my pace a lot**[AWP2_QD12Q45]**

Not at all	1	2	3	4	5	6	7	Very much

46. I have *increased* my pace a lot**[AWP3_QD12Q46]**

Not at all	1	2	3	4	5	6	7	Very much

47. I tried to stay close to other group members**[AWP4_QD12Q47]**

Not at all	1	2	3	4	5	6	7	Very much

Dubious Thoughts (DT_QD12) (Contemplation of Hostile Intent)
During this game:

48. I was wondering whether I looked suspicious to the other group members **[DT1_QD12Q48]**

Not at all	1	2	3	4	5	6	7	Very much

49. I would rather have not played this game with this group**[DT2_QD12Q49]**

Not at all	1	2	3	4	5	6	7	Very much

50. I was thinking about what I had to hide from the other group members **[DT3_QD12Q50]**

Not at all	1	2	3	4	5	6	7	Very much

51. I was wondering whether I was doing something that I was not allowed to do **[DT4_QD12Q51]**

Not at all	1	2	3	4	5	6	7	Very much

Situational Self Awareness (SSA_QD12)

During this game:

52. I was aware of everything in my direct surroundings **[SSA1_QD12Q52]**

Not at all	1	2	3	4	5	6	7	Very much

53. I was aware of my inner feelings **[SSA2_QD12Q53]**

Not at all	1	2	3	4	5	6	7	Very much

54. I was aware of the way I presented myself **[SSA3_QD12Q54]**

Not at all	1	2	3	4	5	6	7	Very much

55. I was aware of how I looked **[SSA4_QD12Q55]**

Not at all	1	2	3	4	5	6	7	Very much

Manipulation checks
Hostile Intent Check (HI_QD12)
During this game**:**

56. I was motivated to make my group perform worse **[HI1_QD12Q56]**

Not at all	1	2	3	4	5	6	7	Very much

57. I felt I was doing something on purpose to hinder group performance **[HI2_QD12Q57]**

Not at all	1	2	3	4	5	6	7	Very much

58. I felt I had hostile intentions **[HI3_QD12Q58]**

Not at all	1	2	3	4	5	6	7	Very much

Motivation check (MOT_QD12)
During this game:

59. I was motivated to obtain a good score in this game **[MOT_ QD12Q59]**

Not at all	1	2	3	4	5	6	7	Very much

- This was the final question of the questionnaire for **this** game; thank you! -

Appendix 12 Mole questions

Mole questions participants game 1

Dear participant,

The next few questions will be about the identity of the Mole and his or her way of handling within your group during the 1st game that just occurred. Try to answer the questions as correct as you can because you will be scored by them according to how many questions you have correct. The participant that has got the least questions about the Mole correct will the least points. Vice versa for the best participant.

- Who do you think the Mole is?

  ……

- Why do you think that?

  ……

- What was his or her way of handling during the game that you find suspicious?

  ……

- Do you find any of the other participants suspicious?

  ……

- Was the Mole more suspicious in part I or in part II in game 1?

  ……

- Why do you think that?

  ……

- Do you think that after game 1 you are making a good chance of winning the competition?

  ……

- Why?

  ……

- Did you try anything yourself to make you suspicious?

  ……

Mole questions participants game 2

Dear participant,

The next few questions will be about the identity of the Mole and his or her way of handling within your group during the 2nd game that just occurred. Try to answer the questions as correct as you can because you will be scored by them according to how many questions you have correct. The participant that has got the least questions about the Mole correct will the least points. Vice versa for the best participant.

- Who do you think the Mole is?

  ……

- Why do you think that?

  ……

- What was his or her way of handling during the game that you find suspicious?

  ……

- Do you find any of the other participants suspicious?

  ……

- Was the Mole more suspicious in part I or in part II in game 2?

  ……

- Why do you think that?

  ……

- Do you think that after game 2 you are making a good chance of winning the competition?

  ……

- Why?

  ……

- Did you try anything yourself to make you suspicious?

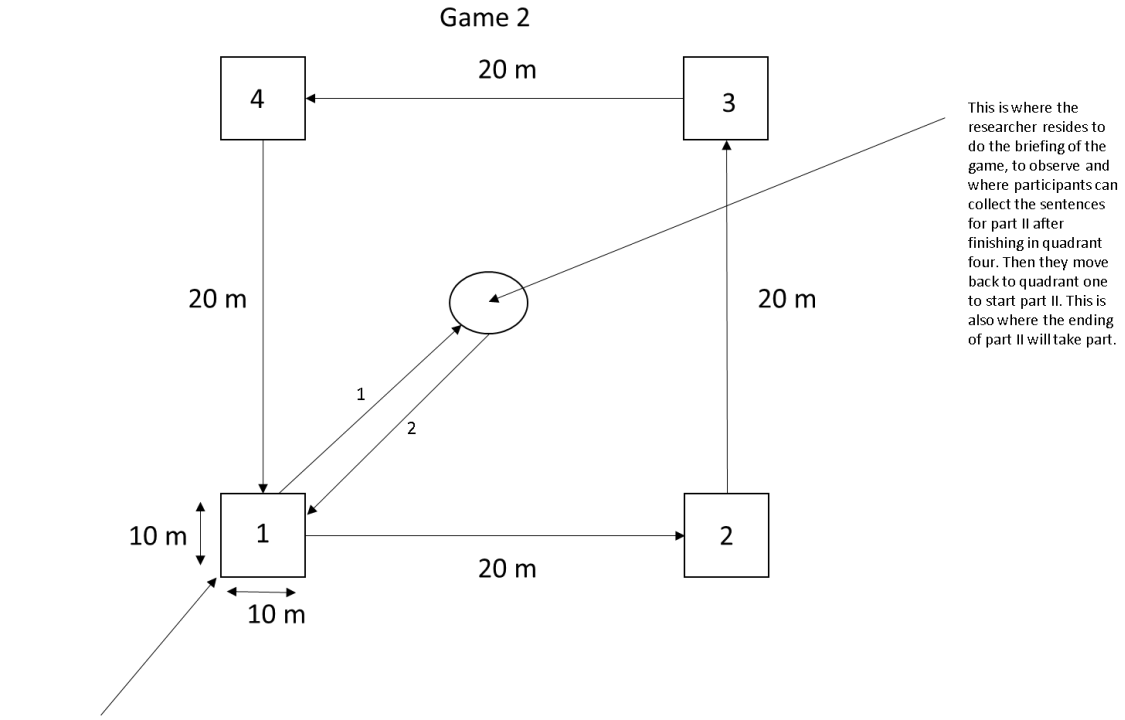
  ……

Appendix 13 Explanation and elaboration of game 2: pylons & stories game

The second game was about participants playing a pylons and stories game (please advise appendix 6 for game 2 specific instructions). Also, instructions were given in the same manner as in game 1 but in location 2 (See figure 2 and appendix 6). See visualisation game 2 below in figure 5. In this game there was more at stake because this was the last game in which participants could score mollar in order to win the competition. Therefore, even more competitional drive was expected between participants and groups. Also, groups probably felt more as one group because they would know each other a bit better. Finally, the pressure of someone trying to sabotage the group's performance would also most likely be more. The purpose of this game was to further reinforce the feeling of working together as a group moving from quadrant to quadrant with the pylons while at the same time they gathered sentences and putting them together in a story. At the same time the goal was to further increase competitiveness amongst group members to win as much mollar as they could to win the prize. In addition, pressure was reinforced because there was a larger amount of money at stake that the group could win by means of the stories element in the second part of game 2.

Figure 5

Overview Setup Game 2



The first part of the game started when participants needed to move all four pylons with balls on top of them from one quadrant to another. These quadrants were spaced out 20 meters apart from each other which were marked by the confederate (See figure 2 for location 2 game 2 and figure 5 for setup game 2). The measurements of the quadrants were twice the size as of game 1, namely 10 by 10 meters. When they reached the next quadrant they all had to put down the pylons on the ground in order to win mollar. Therefore, participants needed to keep the ball on top of the pylon. If the ball fell on the ground from one of the group members then everyone had to start over in the quadrant they just started. However, if the ball fell on the ground there was a penalty of minus 50 mollar. Same rules as in the previous game were considered for moving from quadrant to quadrant order. Participants would make mistakes because they wanted to move as fast as possible to win the game, either for themselves or the group. The mole would try to sabotage the group's performance by example of letting group members move too fast and letting the ball drop on the ground. This in turn led to more time to move and resulting in less mollar gained. The group could earn 100 mollar per subsequent quadrant reached with all group members. See appendix 9 for scoring and rules criteria for game 2.

In addition, when they reached quadrant one again one round was completed and the group received a sentence written on a piece of paper – this was the start of part 2 of game 2 (see appendix 6). This was a randomized sentence belonging to one of two stories. The faster the group completed a round the more sentences the group could gather. When the game was concluded the group had to guess what the stories were about and had to write this down on a piece of paper and give this to the researcher. For one correct story the group gained 250 mollar and for the both of them true, 750 mollar in total (See scoring and rules criteria). The content of both stories can be found in appendix 12 and the answer format for this part in appendix 13. The mole also tried to cause confusion in correctly guessing the stories. When the game ended; again same as before, participants filled in the questionnaires, the mole questions and the group got scored.

Appendix 14 Content stories game

Story 1:

The Woodcutter

1. Once upon a time, there was a woodcutter, who lived in a little house in a beautiful, green wood.

2. One day, he was merrily chopping some wood, when he saw a little girl skipping through the woods, whistling happily, followed by a big grey wolf.

3. Deciding it was really none of his business, the woodcutter went back to chopping wood, until he heard a scream!

4. He grabbed his axe and ran towards the noise, where he found that he was too late: the big grey wolf had already eaten the little girl and her granny.

5. And the moral of this story is: all it takes for evil to triumph is for good men to do nothing.

Story 2:

Goldilocks and the Three Bears

1. One upon a time, there was a little girl with beautiful golden hair and her name was Goldilocks.

2. One day, she decided to go for a walk in the woods, where she found a sweet little cottage, where there was nobody home.

3. Willfully and destructively, she went through the house like a whirlwind, causing damage and stealing food wherever she went.

4. Understandably, when the three bears came home, they were furious at the mess she'd made and immediately called the police.

5. In the end, Goldilocks was given 100 hours of community service and an ASBO.

Optional story 3:

Robert and the Aliens

1. Robert was bored of sitting around waiting for his sister to finish her homework, so he decided to go outside and play in the garden.

2. Wearily, he plopped himself down on the grass and stared grumpily up at the sky, before realising that there was something strange up there.

3. "What on earth is that?" he yelled, terrified, as the strange object zoomed down until it was only a few feet away, revealing rows and rows of weird green faces staring at him out of grey, circular windows.
4. Suddenly, he heard a call, "Roooo-bert", and, blinking, turned his head to gabble at his sister in shock, but when he turned back, the spaceship was gone!

5. Had it ever really been there at all?

Appendix 15 Answer format guessing stories

Story 1:

……

……

Story 2:

……

……

Appendix 16 Debriefing Who is the Mole field experiment

Dear participants,

Thanks for your participation in this field experiment. During the current experiment, you have been slightly misled due to research purposes.

First, there are only two games to be played. The last and third game is not there, it is only there to make you as a group move to a third location while your behaviour in terms of movement as a group is measured by the GPS trackers.

In addition, there are slight deviations in the way the smartwatch is allocated to participants. The smartwatch is not going to be distributed to the best participant that has gained the highest individual score. In fact, only how much Mollar gained per group has been scored and noted down. The reason behind is that for research purposes it is important to make you participants as competitive as you possibly can against each other. Therefore, in order to give everyone equal chances in winning the smartwatch, it is raffled amongst all participants in the experiment. Thus, not allocated to the best participant as stated in the briefing since no individual scores are noted in order to reduce the complexity of the experiment. Hope these explanations help to understand the experiment better. If you have any further questions you can always contact me via the information provided below.

Please be so kind not to share or discuss the content of this research with people that could still pose a potential participant in this field experiment. For the research, it is important that participants are not informed in advance in terms of the research question, methodology and purpose or the content of the study itself in whole.

Thank you sincerely for participating in my field experiment.

Yours sincerely,

Carsten

Contact information research:

Carsten van Roon

j.h.c.vanroon@student.utwente.nl

University of Twente

Master Psychology in Conflict, Risk & Safety

Master thesis research

Appendix 17 Materials for one run and one group

- Numbers GPS trackers for on the back x12 (4x3 trackers per participant)
- Background information Mole game x1
- Noting paper for documenting experiment x1
- Key cords x4 (2-3 trackers per key cord)
- Pencils x8
- Clipboards x5
- Informed consent and information sheet x8
- Scoreboard leaders x1
- Scores & rules criteria x1
- GPS trackers x4
- Pylons x32
- Balls x5
- Coloured cards x7
- Answer format colour combinations x1
- Instructions games (group and individual (participant/mol))x4
- Sentences stories x1
- Answer format guessing sentences x1
- Complete stories x1
- Questionnaires x12 (before x4, during x8)
- Mole questions x8 (after game 1 x4, game 2 x4)
- Visualisations game I and II x1
- Debriefing document x4

Appendix 18 Delivering GPS data in correct format (ZIEPERT ET AL, 2018)

In this files is shortly explained how you can transmit the data for analysis.Explanation of the excel file

Table 1: Explanation of the columns

tracker:

id at the back side of the tracker

team:

group or team id if present, otherwise leave empty

ppn:

id of the participant

file:

filename

comment:

comments about the data, for instance: data missing, participant requested deletion of data, …

When you enter the data in the Excel file:

- Include missing tracks in the excel file. In this case leave "file" empty and explain in comments why the data is missing.

- Make sure all the gpx files are in the same folder with the excel file.

- Make sure the data are in the right format as explained in table 1.

Variables to calculate

Send an overview the variables you want to have calculated. The possible variables are:

- distance_in_meter

- duration_in_seconds

- average_kmh

- sample_deviation_kmh

- sample_deviation_in_bearings (measurement for variation in direction)

- average_team_distance

- average_deviation_from_shortest_route (you have to provide the coordinates of a finish line)

The data can also be split by areas. The splits can be created based on:

- A polygon of coordinates and all points within the polygon are selected.

- A polygon of coordinates and all points outside the polygon are selected.

- Points between to polygons of coordinates.

- A specific time or time interval.

It is also possible to calculate other variables, but please ask this upfront.

Coordinate format
Coordinates have to be provided with the “signed degrees format” / “decimal degrees” format. Within this format the latitudes range from -90 to 90 and the longitudes range from -180 to 180. You can extract the data for instance with google earth or google maps.

Appendix 19 How to prepare GPS data in more detail

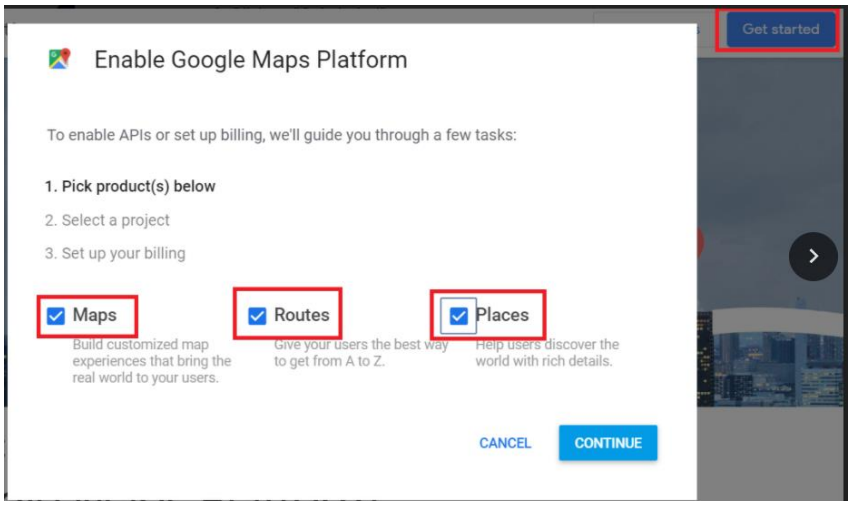
GPS data was extracted from loggers and prepared and analysed with the software R package Psyosphere and accompanied by the manual for the same (Ziepert et al., 2018). A programming script in R was adopted from Ziepert et al., submitted; Ziepert et al., 2018 and extensively adjusted a recoded to the current study in order to properly prepare and analyse the GPS data.

Due to new updates for Google Maps errors occurred in plotting participants tracks in R and therefore a Google Cloud API key had to be created to solve this issue. In collaboration with Ziepert et al., (submitted); Ziepert et al., 2018 a manual was created in order for the plotting of tracks in R to work and can be found in appendix X. Before creating the tracks a .csv file had to be created with columns for team, participant, tracker and id in the same file map as all the .gpx data files of each participant. This was a prerequisite in order for the R script to work properly. The script was executed and then created tracks on Google Maps for the distances travelled by each participant during each game. These tracks were inspected for suitability while running the script. Then accurate tracks were chosen and the script as just explained was run again.

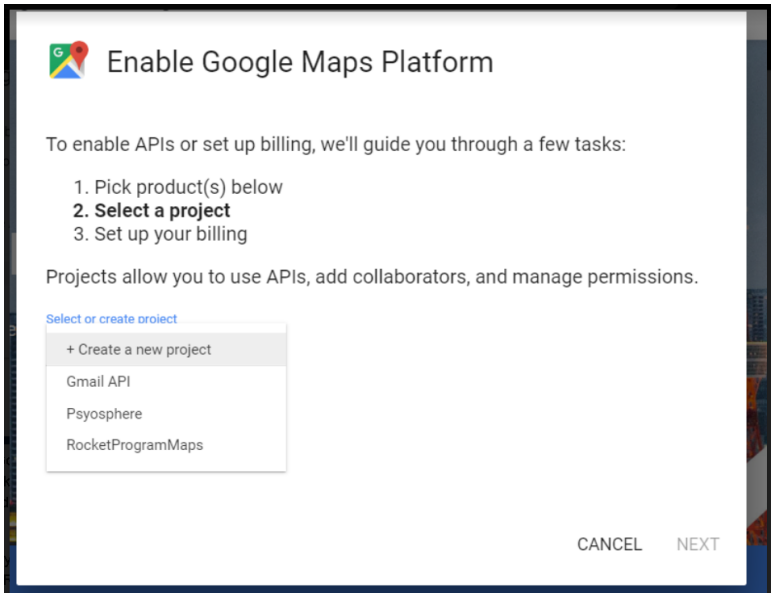
Two polygons with GPS coordinates were selected that included only the area which included participants tracks of game 1 and game 2. Only accurate GPS data that converged in the polygons during the games was included into the analysis because of the scope of the current study. Within Google maps these polygons could be saved as .kml files which then could be opened by notepad to trace the coordinates. These coordinate had to be inserted into the code script within R.

Appendix 20 Manual google API key

1. Open https://cloud.google.com/maps-platform/
2. Click on "Get started"
3. Select all three option



4. Click on "Continue"
5. Create new project with name Psyophere and confirm with next



6. Enter your billing details (Google won't charge you, as they explain in the text)
7. Copy the API key. It will look like "mQkzTpiaLYjPqXQBotesgif3EfGL2dbrNVOrogg"
8. Enter the API key in the code below in R and run it:

```
library("ggmap")

register_google(key = "add_your_key_here", write = TRUE)

has_google_key() # Should return TRUE
```

Appendix 21 GPS Demarcations polygons

Segment	Latitude (6) and Longitude (52)
Game 1	6.849528022990096,52.24068356979578,0 6.849035175544882,52.24070175782576,0 6.848716128586929,52.23996814302926,0 6.849614523559704,52.23975725355338,0 6.849694517873397,52.23992618962506,0 6.849796456473998,52.24000930637508,0 6.849749128067664,52.24009955946494,0 6.849870341771498,52.240500161547,0 6.849528022990096,52.24068356979578,0
Between Game 1 and Game 2	6.849858795165707,52.24049673491741,0 6.849778582370581,52.2402292659096,0 6.849744445337061,52.24010147539577,0 6.849804470813949,52.24008458066924,0 6.85021213705979,52.24027080164992,0 6.850316448363724,52.24048867015167,0 6.849593687263536,52.24131162130575,0 6.848706048832598,52.24166111998796,0 6.848623424030278,52.24115860164267,0 6.849858795165707,52.24049673491741,0
Game 2	6.849096256484588,52.24214078902748,0 6.848654734170219,52.24167826244863,0 6.849593369825979,52.24130939883006,0 6.850082029607238,52.24188165546926,0 6.849096256484588,52.24214078902748,0
Between game 2 and game 3 (debriefing point and finish)	6.850069231704381,52.24188084021819,0 6.849638595921388,52.24136828068801,0 6.851315867199055,52.24082130442215,0 6.851693623003592,52.24144119714487,0 6.850069231704381,52.24188084021819,0
Finish line	6.851197586880115,52.24088344211571,0 6.851437580969877,52.2412912597072,0

Appendix 22 Practical recommendations experiment

Future research should focus mainly on improving the methodological setup of this type of field experiment in a similar environment. The reason for this is that by optimizing the setup of a similar experiment one can better extract generalizable results for subsequent analyses and theoretical implications. To start with, participants should always wear 3 trackers in order to cover for lost sensory date for one of the trackers and, to average and minimize the combined standard error of the sensors. Secondly, when designing an experiment as such, try to avoid too much complexity and differences between experiment sub elements, in this case the different games. This in turn will increase traceability of effects and reduce redundant elements. This will consecutively lead to increased and consistent immersion of participants yet again contributing to generalizability. Last but not least, and this relates back to the trackers is that larger distances are required than used in the current experiment. Especially, for game 1 the distances were too small. These distances should be more in the scale size as used in experiment 2 or larger to draw solid conclusions. Past research has shown that sensor accuracy is an important factor in adequately detecting movement patterns (Kjærgaard et al., 2013; Ziepert et al., n.d.). Therefore it is recommended to combine multiple GPS systems in conjunction with even more sensitive trackers then currently used in order to accurately pinpoint GPS coordinates of individuals. This in turn will lead to more accurate linkage to traits and mental states.