Do we dehumanize people with intellectual disabilities and people of low socio-economic status?

A study of explicit, implicit and neurological dehumanization.

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Abstract

While research in the field of dehumanization has delved into the denial of humanness within ethno-national groups, the majority of studies have focused on the blatant dehumanization evident across race and ethnicities. This study investigated the more subtle dehumanization of ethno-national in-group members, specifically people with intellectual disabilities and people of low-socioeconomic status, using explicit, implicit and neurological measures. Explicit measures, assessed using self-report questionnaires, revealed a positive association between traits ascribed to animals and traits ascribed to both people referred to as chavs and people with Down syndrome (DS). Implicit findings from three single target implicit association tests (ST-IATs) indicated that both chavs and people with DS were considered “less human” than controls. These results provide support for subtle dehumanization of people with intellectual disabilities and people of lower class. Neurological dehumanization was investigated using an ERP methodology. Visual inspection of grand averages appeared to indicate differences between groups in early and central epochs. Neuronal activity within 200-250ms in response to chavs, people with DS and controls influenced mean peak amplitudes within eight different scalp regions. Exploratory analysis then revealed potential for a moderating effect of level of dehumanization on this interaction in central electrode sites. Additionally, significant differences in mean peak amplitude were found in the eight scalp regions within the 300-500ms epoch. This implies differential neuronal activity in response to dehumanized groups. Suggestions for future research are provided including further investigative research in relation to trends of the ERP task.

Introduction

Across the history of western society, the norm has been for the slow expansion of equal rights and consideration (Singer, 2011). For generations, from the battles for equality for ethnic minorities, for women, and most recently for homosexual people, as a society we have fought for equal rights. These struggles have often had to confront and overcome discrimination, one pernicious form being the tendency to see others as less than fully human, or to dehumanize them.

Dehumanization

Dehumanization involves seeing or treating human beings as less than human, and typically includes the denial of uniquely human attributes to particular individuals or groups (see Haslam, 2006; Haslam & Loughnan, 2014 for review). When thinking of dehumanization its most extreme forms generally come to mind: the possession of slaves as property, the treatment of Jews, gypsies, and homosexuals under Nazi rule, and more recent genocides such as those in Cambodia, Rwanda, or Bosnia/Serbia. This treatment of people as less than entirely human, however, is apparent in more subtle ways in everyday life that are both degrading and undermining to victims (Bastian & Haslam, 2011). Psychological research has robustly shown that dehumanization is still evident in today's society across such diverse domains as race (Goff, Jackson, Di Leone, Culotta, & DiTomasso, 2014), religion (Tam, Hewstone, Kenworthy, Cairns, Marinetti, Geddes, & Parkinson, 2008), nationality (Leyens, Demoulin, Vaes, Gaunt, Paladino, 2007; Marcu, 2007), and gender (Loughnan, Pina, Vasquez, & Puvia, 2013; Viki & Abrams, 2003). Dehumanization can also be applied to smaller groups of people, such as the mentally ill (Martínez, Piff, Mendoza-Denton, & Hinshaw, 2011), intellectually disabled (Carlson, 2009), physically disabled (Mitchell, 2001), lower social classes (Loughnan, Haslam, Sutton, & Spencer, 2014), criminals (Bastian, Denson, & Haslam, 2013), and even certain professions (Loughnan & Haslam, 2007). Dehumanizing others in everyday contexts has real consequences, undermining moral concern and helping behaviour (Andrighetto, Baldissarri, Lattanzio, Loughnan, & Volpato, 2014; Bastian, Laham, Wilson, Haslam, & Koval, 2011). Further, its occurrence is consequential for violence, with the denial of humanity promoting harm including genocide and slavery (Goff, Eberhardt, Williams, & Jackson, 2008), justifying not only harm towards others but also rationalising the avoidance of acting in helpful and virtuous ways in relation to others in need (Haslam & Loughnan, in press). Despite this awareness of the consequences of dehumanization, dehumanization is apparent both between nations and across ethnic groups. Dehumanization has been investigated quite broadly yet this research has been unequal between smaller and larger groups. There is a vast array of literature regarding the nature of dehumanization in relation to ethno-nationalism (i.e. race, ethnicity, religion) and gender, but relatively little about dehumanization *within* these ethno-national groups in comparison. In Haslam and Loughnan (2014)'s recent authoritative review, of 109 references 83 were studies on dehumanization. Of these, 47 focused on dehumanization across ethno-national groups and ten more centred on dehumanization and objectification of women. The remaining 26 studies explored various areas of dehumanization within ethno-national groups such as dehumanization on the basis of sexuality (MacInnis, & Hodson, 2012), criminality (Bastian, Denson, & Haslam, 2013), and medical practice (Haque, & Waytz, 2012; Haslam, 2007; Vaes, & Muratore, 2013). This emphasizes the aforementioned imbalance in dehumanization literature. The current study concentrates solely on dehumanization within ethno-national groups, providing robust investigation into the dehumanization of marginalized in-group members, specifically the disabled and the lower class.

This research will focus on the dehumanization of people of low socio-economic status (SES), specifically the group referred to as "chavs" (chav), and people of intellectual disability, specifically people with Down syndrome (DS). *Chav* is a derogatory label applied to people of low SES, sometimes even referred to as the underclass (Hayward & Yar, 2006). The word chav provokes feelings of disgust (Tyler, 2008) bringing to mind uneducated delinquents of lower class. Manley (2010) highlights how it has been claimed that the word 'chav' is an abbreviation of 'counsel-housed and violent' despite this explanation of the acronym emerging after the term was already widely-used, as a method in which to justify this dehumanizing expression. People described as chavs are thought of as "thick" and "violent" and generally looked down upon (Jones, 2012). For this reason, this group are often likened to apes or vermin thus being dehumanized metaphorically (Loughnan, Haslam, Sutton & Spencer, 2014). The use of animal metaphors, while occasionally terms of endearment, are often used in a more damaging and demeaning way (Haslam, Loughnan & Sun, 2011). But even as terms of endearment, animal metaphors are often condescending and degrading.

People with DS become victims of dehumanization for a different reason, a reason more along the lines of pity. DS is a condition that arises from having a third Chromosome 21

(Roizen & Patterson, 2003). It is an intellectual disability. People with DS have distinguishable physical features such as eyes that slant upwards and outwards, a slightly flattened head at the back, a lack of muscle tone known as hypotonia, and a small mouth with protruding tongue (Selikowitz, 2008). People with intellectual disabilities often feel stigmatized and dehumanized by others (Jahoda & Markova, 2004). Winter (2003), when describing the development of the disability rights movement, states how people with intellectual disabilities are denied their autonomy when they are forced to face marginalization and stigma. He writes that even the legislation that is developed to defend their rights actually renders them “disabled and dehumanized” (p. 7). It has often been said that even the way people with DS are referred to is degrading and dehumanizing; people refer to them as ‘a Down’s person’ rather than a person with Down syndrome or use terms such as ‘retard’, ‘handicapped’ to describe them (Down Syndrome Association of Wisconsin, 2015; Global Down Syndrome Foundation, 2015). All of these labels are not only demeaning, but dehumanizing.

These groups both fall victim to dehumanization, although the underlying reasons differ. The stereotype content model (SCM; Fiske, Cuddy, Glick, & Xu, 2002) distinguishes groups from each other on the basis of likability (warmth) and capability (competence). Different combinations of these characteristics elicit different emotions. Those high on both warmth and competence are admired groups, such as sports stars and the middle class; these people elicit pride. People who are envied, such as successful businesspeople or the rich, are perceived as being high in competence but low in warmth. Groups that are high in warmth but low in competence are pitied, such as the disabled or the elderly - this is where DS would fit in to the SCM. Lastly groups that elicit disgust, the homeless for example, are perceived as low on both competence and warmth - this being where Chav would lie (Harris & Fiske, 2006). Regarding the dehumanization of the groups of interest in this study, in terms of the SCM, the more likable but less competent DS group are pitied, while the less likable and similarly less competent chav group are a source of revulsion.

Emotion-based approach to dehumanization

There are a variety of ways in which this denial of humanness can occur. One such approach to exploring dehumanization has been to examine the attribution of human emotions to different targets. Leyens and colleagues (2001) posited that the essence of being human is composed of uniquely human characteristics. They held that individuals tend to attribute these characteristics to themselves and other in-group members, but that out-groups, and other individuals, will be seen to have less of these uniquely human characteristics, less human essence, thus rendering them less human. When exploring uniquely human characteristics, Leyens *et al.* (2000) found that Latin-language speaking students considered uniquely human characteristics to include language, intelligence and reasoning, all of which have previously been identified as a means of out-group discrimination (Bourhis & Leyens, 1994), however, they also indicated a fourth characteristic; *sentiments*, and for this reason the researchers focused on emotions.

The distinction between emotions and sentiments is similar to the scientific distinction between primary and secondary emotions (Leyens *et al*., 2001). Primary emotions are shared by humans and animals and include emotions such as joy, anger, and fear. Secondary emotions are uniquely human and include such emotions as pride, guilt, fondness, and contempt (Leyens *et al*., 2000). Leyens and colleagues (2001) discerned that people were less likely to attribute secondary emotions to out-groups, independent of the emotions valence. They deemed this to be a subtle form of dehumanization, whereby people tacitly undermine the humanity of others. Even when subtle, dehumanization is still damaging to target groups. This more subtle form of dehumanization not only encompasses the refusal to acknowledge the humanity of the out-group but also comprises an eagerness to reject it (Haslam & Loughnan, 2014).

Leyens and colleagues (2003) extended this finding by investigating the phenomenon implicitly. The researchers held that infra-humanization occurs outside of awareness. Using Implicit Association Tests (IATs) findings portrayed that participants found it more difficult to associate secondary emotions to animals and out-groups, and that the reaction time for attributing secondary emotions to the in-group were much faster than that of the out-group, even in the absence of inter-group conflict. The research of Leyens and colleagues lay the foundations for dehumanization research as it revealed that dehumanization occurs in everyday life, and showed that it was tractable to the experimental social psychological laboratory, providing a theoretical basis for, and the potential for further experimental approaches to, dehumanization research.

Trait-based Approach

Haslam (2006), following the work of Leyens and colleagues, continued on this investigation of everyday dehumanization but with a varied approach. He proposed this denial of attribution of secondary emotions to dehumanized groups was one dimension of dehumanization. He suggested that another dimension that could broaden research in this area was to explore the attribution of human nature characteristics and uniquely human characteristics. He suggested that while the emotion-based approach of Leyens and colleagues highlighted the human-animal distinction, there was another form of dehumanization that they hadn't taken into account – the human-object distinction. He held that uniquely human characteristics distinguish humans from animals and include traits such as the ability to be humble, polite, shallow, and impersonal. Human nature traits, which are said to be typically human distinguishing humans from inanimate items, include such traits as being curious, trusting, jealous, and nervous (Crawford, Modri, & Motyl, 2013; Loughnan & Haslam, 2007). Animalistic dehumanization involves the avoidance of attributing uniquely human characteristics to a certain group or individual, while mechanistic dehumanization involves avoiding attribution of human nature characteristics to a particular group or individual (Haslam, Loughnan, Kashima, & Bain, 2008). This account is known as the dual-model approach.

There has been much research centred on animalistic and mechanistic dehumanization since this distinction was made by Haslam (2006). Much of this research focuses on subtle examples of dehumanization rather than acts of extreme dehumanization. For example, Loughnan and Haslam (2007) showed that businesspeople were more likely to be denied human nature traits, whereas artists were more likely to be denied uniquely human traits. This depicted a trend towards mechanistic dehumanization of businesspeople and animalistic dehumanization of artists. With regard racial dehumanization, black people fall victim to animalistic dehumanization being likened implicitly to apes (Goff, Eberhardt, Williams, & Jackson, 2008). Other traditional groups such as aborigines, American-Indians and gypsies also suffer animalistic dehumanization (Castano & Giner-Sorolla, 2006; Marcu & Chryssochoou, 2005; Saminaden, Loughnan, & Haslam, 2010). Bain and colleagues (2009) found that Chinese people were a target of mechanistic dehumanization, while Martinez, Rodriguez-Bailon and Moya (2012) determined Germans to be dehumanized in a mechanistic manner to a greater extent than Spaniards or gypsies. The sexual objectification of women has been linked to animalistic dehumanization (Puvia & Vaes, 2013; Vaes, Paladino & Puvia, 2011) while to objectify women in terms of appearance has been linked to mechanistic dehumanization (Morris, 2013). Harris (2006) stated that these two types of dehumanization may overlap in terms of a certain individual or group, and while Rudman and Merscher

(2012) held that sexually aggressive men tended to dehumanize women both in a mechanistic and animalistic manner, what Morris (2013) specified was that the objectification of women can be animalistic or mechanistic depending on whether a sexual premise is evident or there is a primary focus on beauty.

Mind Perception Account

The mind perception account (Waytz, Gray, Epley, & Wegner, 2010) compliments this dual-model approach by investigating dehumanization in relation to the mind. It has been found that people tend to ascribe mind along two dimensions; agency and experience (Gray, Gray, & Wegner, 2007). Agency relates to mental abilities such as planning, acting, and self-control; it separates humans from non-human animals. While experience refers to such things as personality and the ability to sense and feel; it separates humans from machines and inanimate objects. Haslam, Kashima, Loughnan, Shi, and Suitner (2008) investigated mind perception in relation to humans and non-humans - namely animals, robots and supernatural beings. Findings revealed that adult humans were judged to be superior to animals in terms of agency, to supernatural beings in terms of experience, and to robots in terms of both agency and experience. Haslam and Loughnan (2014) further highlight both the connection between agency and uniquely human attributes, and the connection between experience and human nature characteristics. A clear connection is revealed between animalistic dehumanization and the denial of both uniquely human characteristics and agency, while mechanistic dehumanization is associated with the denial of both human nature characteristics and experience. This indicates that when someone is dehumanized, they are not only being denied emotions and personality traits, but also particular aspects of mind.

Neurological dehumanization

The preceding measures have typically used questionnaire or reaction time / accuracy tasks to assess dehumanization. More recently, researchers have started to employ neuroscientific approaches. Social neuroscience research points to an integral role for the medial prefrontal cortex (mPFC) in social cognition and dehumanized perception (Harris & Fiske, 2009). Using fMRI, Harris and Fiske found support for reduced activity in the mPFC in response to dehumanized targets in accordance with the SCM. As previously mentioned, the SCM utilises warmth and competence as distinguishing factors for different groups. The authors observed reduced mPFC activation for targets who were rated as eliciting disgust in comparison to the other targets who were rated as eliciting pride, envy, or pity. Cikara, Eberhardt and Fiske (2011) also reported reduced mPFC activation in sexist heterosexual males when viewing sexualised female targets. The researchers stated that, in contrast to the previously mentioned study by Harris and Fiske, the target group was not one that participants were disgusted by and may wish to avoid, but one that their male student sample would more than likely wish to approach; hence this study lent further support for reduced mPFC activation in response to dehumanization, regardless of SCM categories.

In an EEG study investigating SCM target groups, a negative component was recorded at 100ms for groups that elicited pride, envy, and pity, followed by a second negative component at 300ms. The researchers stated that this second negative component was maximal for targets that elicited disgust (Harris, Gelfando, Escobedo, & Fiske, unpublished). Research on out-groups has shown that greater attention is needed when processing faces of out-groups and larger P2 amplitudes have been associated with faces of these groups (Amodio, 2010). Further inquiry in this area has uncovered larger N170 amplitudes in response to out-group members (Ofan, Rubin, & Amodio, 2011; see Amodio, 2014, for review). Additionally, the N400 has previously been linked to research on stereotypes (Hehman, Volpert, & Simons, 2013; White, Crites Jr., Taylor & Corral, 2009) but a particular component has not been found in relation to dehumanization. While behavioural measures such as reaction time studies have been enlightening, neurological studies such as those that utilize an ERP methodology can incorporate behavioural tasks while measuring neuronal activity, thus providing potential for more informative findings.

Study Aims and Rationale

The aim of this study is to investigate dehumanization within ethno-national groups explicitly (using a trait-approach), implicitly (with a focus on animalistic dehumanization) and neurologically (using an emotion-based approach). People of lower class, specifically the group referred to as chavs, and people with intellectual disabilities, specifically people with Down syndrome are the focus of this study.

The aforementioned study of Loughnan and colleagues (2014) investigated animalistic dehumanization in relation to people of lower class. The researchers explored particular groups of low SES with location appropriate labels; chavs in the UK, bogans in Australia, and white Trash in the US. Using self-report ratings it was established that participants were more likely to attribute traits that they had deemed animalistic to lower class out-groups. The current study aims to replicate the findings of this study, while also investigating implicit associations between chavs and animals, and any electrophysiological indications of dehumanization using an emotion based approach.

This study also aims to investigate the dehumanization of people with intellectual disabilities, particularly those with DS. While it has often been claimed that people with DS are dehumanized (Keith & Keith, 2013), there is no research particularly focusing on this area. The current research aims to explore whether people with this condition are dehumanized using an explicit trait-based approach, an implicit approach focusing on animalistic dehumanization and a neurological approach focusing on the emotion-based approach to dehumanization.

Regarding the neurological aspect of this study, there is scant evidence for an electrophysiological effect of dehumanization. This study aims to establish whether neutral faces of each of the target groups would elicit a different electrophysiological response to that of neutral faces of healthy middle-class adults. It is yet to be established whether there is a particular event related potential (ERP) that can be associated with dehumanizing behaviour. While research has identified medial temporal regions to be associated with dehumanization (Cikara, Eberhardt, & Fiske, 2011; Harris & Fiske, 2006) there has been little research into temporal associations with dehumanization. Though there has been one unpublished ERP study that investigated stereotypical behaviour using the SCM (Harris, Gelfand, Escobedo, & Fiske, unpublished, cited in Harris & Fiske, 2009), there hasn't been an ERP study specifically conducted in relation to dehumanization and the emotion-based approach or trait-based approach. This study aims to establish the ERPs associated with the emotion-based approach to dehumanization in relation to people referred to as chavs and people with DS.

Hypotheses

1. It is hypothesized that uniquely human traits are less likely to be ascribed to chavs and people with DS. It is therefore predicted that there will be a positive relationship between the traits attributed to animals and those attributed to chavs and people with DS.
2. It is hypothesized that the implicit tasks will indicate animalistic dehumanization for both chavs and people with DS in comparison to the control group (healthy, middle-class people).
3. It is predicted that the neurological dehumanization task will indicate the avoidance of attributing secondary emotions to dehumanized groups, with incongruent trials

producing differential ERP component activity to congruent trials. This may occur around the N170 component which is the face processing component, or from 300ms onwards as processing of emotional stimuli has been found to occur around this time and prior research has implicated the N400 in relation to stereotypes. As this is exploratory research it is difficult to predict the particular ERP component that may show an effect.

Pilot Method

All tasks were piloted before conducting the main study. The ERP task was altered slightly after piloting but the explicit and implicit tasks remained the same.

Design

The pilot study used a within-subjects design. The independent variables included chavs and people with DS. The dependent variables included; the traits attributed to each group during the self-report measures, the latency and accuracy of ST-IAT trials, the reaction times and accuracy during the EEG task, and the location of the voltage change, its pattern over time and the direction and timing of change after stimulus output during the EEG.

Participants

Participants were recruited using both convenience sampling and MyCareerHub, a recruitment system at the University of Edinburgh. Five participants (2 male and 3 female) were recruited for the pilot study. Participants were aged between 22 and 33 (M = 25.00; SD = 4.53). All were students of the University of Edinburgh and gave informed consent prior to participating. The study took no more than three hours and participants were paid £20.

Explicit Dehumanization

Materials and Stimuli. This study utilised a modified version of the self-report questionnaire employed in Loughnan *et al*. (2014)'s study on dehumanisation and social class. The questionnaire involved ratings of 40 big five personality trait items, as in Haslam & Bain (2007) in relation to each group. The online survey system Qualtrics was used to develop the questionnaire. There were three blocks, one referring to humans and animals (block 1), one referring to people with DS (block 2) and one referring to chavs (block 3). The blocks were automatically randomised between participants using Qualtrics. The questions were answered on a 5-point Likert scale (see Appendix A).

Procedure. Each participant completed the modified versions of the questionnaire employed in Loughnan *et al*. (2014)'s study on dehumanisation and social class. The blocks were randomised between participants.

Implicit dehumanization

Materials and Stimuli. Implicit dehumanization was measured using Single Target-Implicit Association Tests (ST-IATs). The ST-IAT is a modified version of the Implicit

Association Test (IAT) which investigates implicit attitudes towards just a single object or group, rather than two complimentary objects or groups. Previous research has found the ST-IAT to have satisfactory levels of reliability and predictive validity (Bluemke & Friese, 2008). Images with appropriate licensing were obtained from both Flickr™ and Google images for the purpose of the ST-IATs. Six control images, six images of people with DS and six images of chavs were attained for the implicit tasks. Three male and three female images were gathered for each target group (see appendix C).

Inquisit 3 (2012) was used to design the three ST-IATs. One focused on people with DS, one focused on chavs and one focused on healthy middle-class people (control group). The word stimuli used for the three ST-IATS included, in the *human* category; "human", "society", "person", "culture", "language" and "logic", and in the *animal* category; "animal", "beast", "pet", "instinct", "nature" and "creature".

Each ST-IAT employed the category labels *Human* and *Animal*. The single target category for each ST-IAT was *Down syndrome*, *Chav*, or *Healthy middle-class person* depending on the ST-IAT employed. Each ST-IAT consisted of 5 blocks, the order of which following the format suggested by Greenwald, Nosek and Banaji (2003). The first block was a practice block of 20 trials in which participants assigned words to the categories *human* and *animal* using the "e" and "i" keys on the keypad. Whether the target category began on the same side as the *human* category or the *animal* category was randomized. All blocks following the practice block also employed the images of the target group along with the original word-stimuli from the practice block. If, for example, the target category began on the side associated with the *human* category, it would remain here for the next two blocks and then would switch to the side associated with the *animal* category for the fourth and fifth blocks. The second block consisted of 20 trials, included both the image stimuli with the word stimuli, and was considered a practice block for when the target category was associated with the *human* category. The third block was then considered a critical block, consisting of 40 trials, where the target category was again on the side associated with the *human* category. After the third block, the target category changed sides and another practice block of 20 trials occurred for this association. The fifth block, which was the second critical block, held the target category on the side associated with the *animal* category, and again consisted of 40 trials. Each ST-IAT was automatically counter-balanced in that for half the participants, the target category began on the same side as the *human* category and for the other half the target category began on the same side as the *animal* category.

Procedure. Each participant took part in three ST-IATs: one focusing on people with DS, one focusing on chavs and one control ST-IAT. The ST-IATs were randomized between participants.

Neurological Dehumanization

Materials and Stimuli. For the pilot ERP task, images of chavs, people with DS and control people were gathered from Flickr™. All images had a creative commons licence. Two images (one male and one female) were sourced for each group. Using Microsoft Paint, the images were cropped to the same size (500x536px) and primary (*happy* and *angry*) and secondary emotion words (*proud* and *guilty*) were written across the centre of each image. Each image was used four times accompanied by a different emotion word each time, thus there were 24 stimuli for the ERP task (see Appendix C).

E-Prime 2.0 (Psychology Software Tools, Inc., 2015) was used to design the ERP task and program each trial. Each trial consisted of one of the 24 stimuli in the centre of the computer screen. Participants were asked to indicate whether the written emotion word was positive or negative using an SR-Box. Each stimulus had 100 trials, and the task consisted of 10 blocks of 240 trials. The order of trials in each block was randomised. Each trial began with a fixation cross for 300ms, with the image then being presented for 300ms, with an answer period of 900ms in which another fixation cross was presented. The task was counterbalanced as the response buttons were reversed at the half-way point of the task. Event triggers were sent over the parallel port to the EEG acquisition system.

EEG was recorded from 64 head electrodes and six reference electrodes using a Biosemi Active Two amplifier at a sample rate of 1024 Hz. Triggers generated from the experimental code were recorded on the EEG device to allow timing synchronisation. It was ensured that electrode offsets fell below 20 mV before recording. The six reference electrodes were placed on two mastoids, two temples, and above and below the right eye, to produce better EOG detection. Brain Vision Analyser 2.1 (2014) was used in the pre-processing of the EEG data.

Procedure. At the beginning of the experiment participants were told that an emotion word would be presented on a picture and the participant must indicate whether the emotion is positive or negative. The participants indicated via button presses, using their left and right index fingers, whether the emotion was positive or negative. Participants were told to ignore the emotion on the face of the person in the picture and to respond according to the emotion word written over the face. The blocks were counter balanced and breaks between blocks varied to the participant's needs.

After the 120th trial of each block, 300ms after the stimulus offset, participants were required to classify by gender the previously seen face as quickly as possible via a button press (*Male* or *Female*). These trials were used for verification purposes to ensure participants were paying attention to the faces and not just the words. These verification trials were excluded from analysis.

ERP pre-processing. The pilot EEG data was processed, using Brain Vision Analyzer 2.1, in a similar manner to that of the EEG data for the actual experiment (see Appendix B). No electrode interpolation was carried out on the pilot data and participants with low trial counts were not removed. Grand averages were computed for primary and secondary emotions within the chav, DS and control conditions. These grand averages were examined and from this a decision was made to continue data collection.

Pilot Results

Data collected from the explicit and implicit dehumanization tasks indicated a trend towards dehumanizing behaviour so it was decided to continue testing using these tasks. Grand averages of each condition were generated using Brain Vision Analyser 2.1 (2014) and examined. The results from the pilot study indicated a difference in amplitude around the 220ms mark. There appeared to be a clear difference in amplitude around 300 - 500ms, and later, between conditions (Figure 1) which provided support for continuing with the ERP study after piloting. There was no significant difference in reaction times between conditions [F(5, 18) = .007, $p > .99$] as was the case with accuracy [F(5, 18) = .442, $p = .815$]. This was not surprising due to the nature of the task. Of more interest were the differences in peak amplitudes of the grand average comparisons between the three groups in both primary and secondary emotion conditions. The study was conducted following on from this with some slight changes.

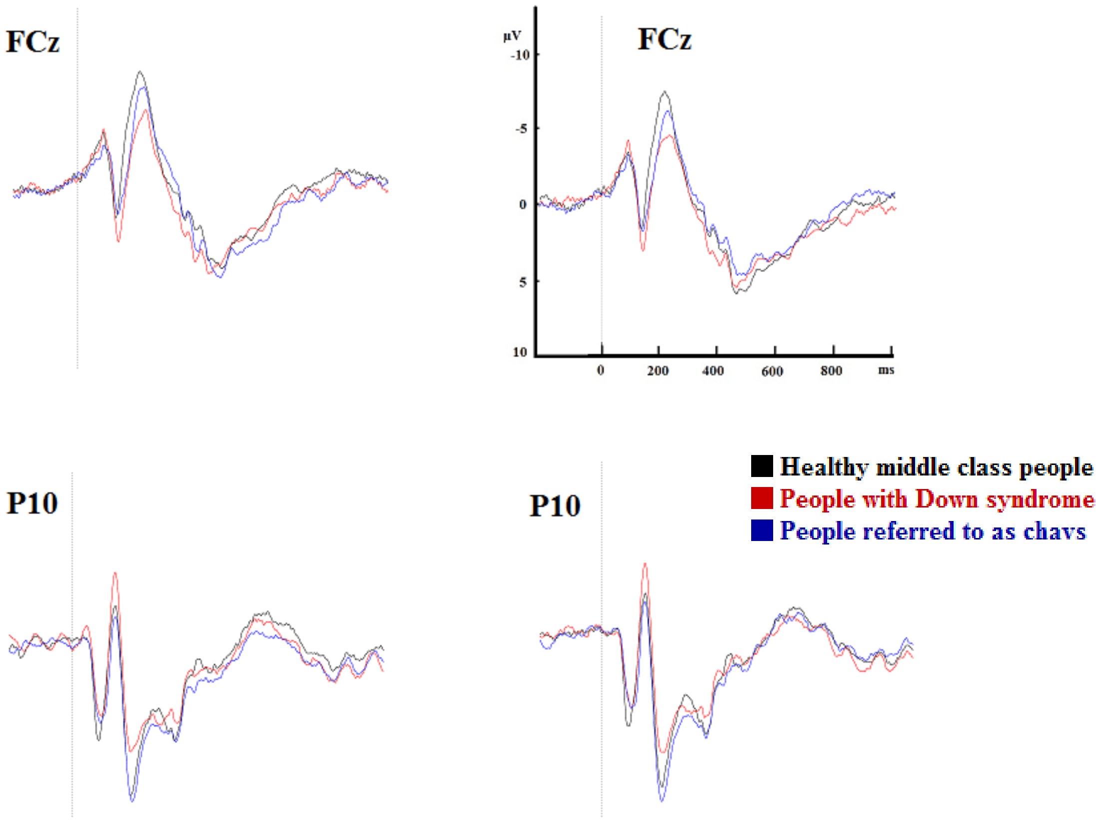

Figure 1. Grand average ERPs from pilot study from anterior (FCz) and posterior (P10) electrode sites in primary emotion condition (left) and secondary emotion condition (right).

Method

Design

The study used a within-subjects design. The independent variables were the groups selected to be investigated in relation to dehumanisation; people with DS and chavs. The dependent variables included; the traits attributed to each group during the self-report measures, the latency and accuracy of ST-IAT trials, and the location of the voltage change, its pattern over time and the direction and timing of change after stimulus output during the EEG.

Participants

Participants were recruited using both convenience sampling and MyCareerHub. Forty participants were recruited in total for the self-report and implicit measures (16 male, 24 female). They were aged between 19 and 40 (M = 24.87; SD = 4.44). Twenty three of these participants also took part in the EEG task (10 male, 13 female). Of these twenty-three participants, three were excluded from analysis due to low trial numbers per condition after pre-processing (N = 20; 9 male, 11 female). All were students of the University of Edinburgh and gave informed consent before participating. Taking part in all three parts of the study took no more than three hours and participants were paid £20 for their time. Participants who took part only in the self-report and implicit tasks were paid £3 for their contribution; this took no more than 30 minutes.

Explicit Dehumanization

Materials and stimuli. The self-reported task was not altered from the pilot study.

Procedure. Each participant completed the modified versions of the questionnaire employed in Loughnan *et al*. (2014)'s study on dehumanisation and social class. The three blocks were again randomised between participants.

Implicit dehumanization

Materials and Stimuli. No adjustments were made to the ST-IATs from the pilot study.

Procedure. Each participant took part in three ST-IATs: one focusing on people with DS, one focusing on chavs and one control ST-IAT with images of healthy middle-class people. The ST-IATs were randomized between participants.

Neurological dehumanization

Materials and Stimuli. The neurological dehumanization task was altered slightly after piloting to produce more accurate results. It was decided to use more neutral images for the ERP task. Images were again obtained from Flickr™ and Google Images with appropriate licensing. A 42 question survey was developed using Qualtrics to assess whether the images were rated as negative, neutral, or positive (*N*=23). All images were matched on valence. Two male and two female images were gathered for each target group. Using Microsoft Paint, the images were then cropped to 500x536px. Each image was used four times, each time with a different emotion word written just below the centre of the image. The words included two primary emotions (*happy* and *angry*), and two secondary emotions (*guilty* and *proud*). Hence, there were 48 stimuli for the ERP task (Appendix D), each with 50 trials rather than 100, retaining the total trial count at 2,400. The main task remained the same as in the pilot task.

E-Prime 2.0 (Psychology Software Tools, Inc., 2012) was again used to design the ERP task, programme each trial and to send event triggers over the parallel port to the EEG acquisition system. Trials were randomized within each block. Brain Vision Analyser 2.1 (2014) was used for pre-processing of the ERP data. Statistical analysis was conducted using IBM SPSS Statistics 22 (IBM Corp., 2013).

Procedure. Twenty-three of the forty participants took part in an ERP task.

At the beginning of the experiment participants were told that an emotion word would be presented on a picture of a face with a neutral expression. The participants were asked to indicate whether the emotion word was positive or negative. The participants indicated via button presses, using their left and right index fingers, whether the emotion was positive or negative. Each trial began with a fixation cross for 300ms, with the image then being presented for 300ms, with an answer period of 900ms in which another fixation cross was presented. The task was counter balanced in that the buttons being pressed were swapped after the 5th block. Breaks between blocks varied to the participant's needs.

Additionally, five times per block, after the 40th, 80th, 120th, 160th and 200th trials, 300ms after the stimulus offset, participants were required to classify by gender the previously seen face as quickly as possible via a button press (*Male* or *Female*). These trials were used for verification purposes to ensure participants were paying attention to the faces and not just the words. These verification trials were excluded from analysis.

The ERP pre-processing steps can be found in Appendix B. For statistical analysis, the 64 electrode sites were divided into 8 scalp regions as per Schmidt-Snoek, Drew, Barile, and Agauas (2015). The eight scalp regions included left anterior, right anterior, left posterior, right posterior, left centre, right centre, centre anterior and centre posterior regions (Figure 2).

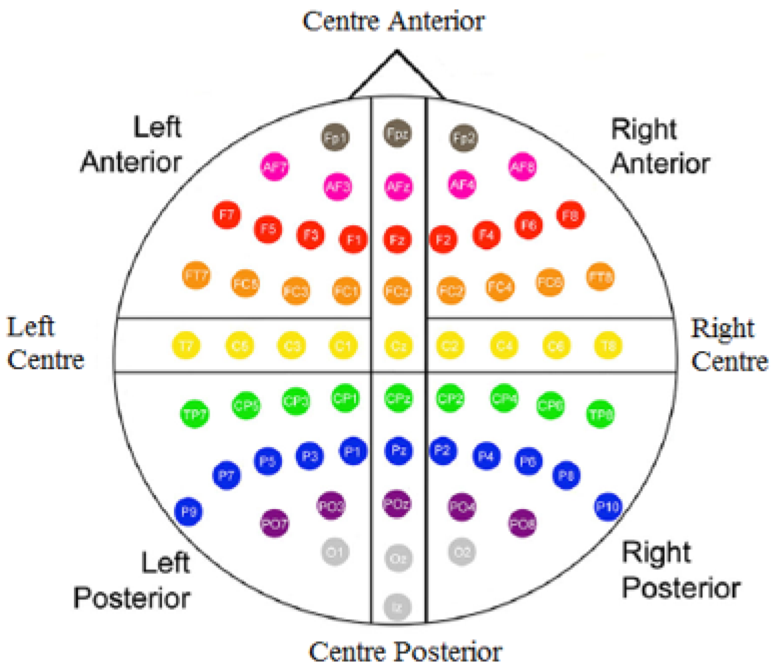

Figure 2. Scalp regions of the 64 electrode sites used for statistical analysis. Adapted from "Auditory and motion metaphors have different scalp distributions: An ERP study", by G. L. Schmidt-Snoek, A. R. Drew, E. C. Barile and S. J. Agauas, 2015, *Frontiers in Human Neuroscience, 9*(126), p. 5. Copyright 2015 by Schmidt-Snoek, Drew, Barile and Agauas.

Results

Explicit Dehumanization

Means were calculated across participants for the forty traits within each of the categories (Chav, DS, and Human-Animal). The data showed no violation of normality, linearity or homoscedasticity. Pearson product-moment correlations indicated a strong positive relationship between trait ratings of chavs and people with DS, and moderate positive relationships between trait ratings of both chavs and people with DS and animal trait ratings (see Table 1). In sum, these results indicated that participants were more inclined to give traits they had rated as more animalistic to both chavs and people with DS, as predicted.

Table 1

Mean correlations between ratings of chavs, people with Down syndrome and animal traits

	Chav	Down syndrome	Animal
Chav	1.00		
Down syndrome	0.70**	1.00	
Animal	0.37*	0.41**	1.00

Note. *p < .05. **p <.01. N = 40.

Implicit Dehumanization

Implicit dehumanization was computed using the D-score algorithm (Greenwald, Nosek, & Banaji, 2003). This algorithm excludes practice blocks and computes a score based on both accuracy and reaction time within congruent and incongruent trials. D-scores lie between -2 and 2, a score of 0 would indicate no preference for either association. A D-score above 0 indicated a stronger association between the target group and the human category, while a D-score below 0 indicated a stronger association with the animal category. Mean D-scores showed the control group to have an association with the human category (M = 0.40, SD = 0.28) that was over three times stronger than that of the chav group (M = 0.11, SD = 0.31) and over twice as strong as that of the DS group (M = 0.17, SD = 0.33). It was not surprising that all three groups were given positive scores as all groups were people. Despite all scores being positive, mean D-scores of the chav and DS groups were clearly lower than that of the control.

The data showed no violation of the assumptions of normality and homogeneity of variance. A one sample t-test was conducted to determine whether the D-scores of the three ST-IATs were significantly different from 0, and therefore indicated a preferential implicit associations between each group and either animals or humans. While all D-scores were positive, and significantly different from 0 (see Table 2), it was clear that chavs and people with DS were not as strongly associated with the human category as the control group, motivating further analyses.

Table 2

Mean differences from 0 of D-scores for chav, DS and control ST-IATs

	Mean	*t*	df	*p*	Cohen's *d*
Chav	0.11	2.34	39	.024	0.52
DS	0.17	3.28	39	.020	0.73
Control	0.40	9.16	39	<.001	2.05

Repeated measures t-tests were conducted to investigate the mean differences between the control ST-IAT and both chav and DS ST-IATs. Consistent with expectations, participants found it easier to associate control stimuli than chav stimuli with the human category (M = 0.29, SD = 0.36), $t(39) = 5.07$, $p < .001$, 95% CI, [0.17 to 0.40], $d = 0.80$. The DS ST-IAT showed a similar pattern; participants also found it easier to associate control stimuli with the human category than to associate DS stimuli with the human category (M = 0.23, SD = 0.36), $t(39) = 4.07$, $p < .001$, 95% CI, [0.12 to 0.34, $d = 0.65$]. When comparing the chav and the DS ST-IATs, there was no significant difference between the means with the chav group showing a decrease of 0.06 in comparison to the DS group $t(39) = 1.03$, $p = .31$, (95% CI, [-0.05 to 0.17], $d = -0.17$). These results showed support for the hypothesis that in comparison to healthy middle-class people, both chavs and people with DS were implicitly dehumanized.

Explicit and Implicit Dehumanization

Pearson product-moment correlational analysis of explicit and implicit measures of dehumanization was conducted in order to examine whether participants' trait ratings on the self-report measure correlated with their D scores on the IATs. Firstly, each participants' self-report trait ratings were analysed to establish how much each participant considered the traits of chavs or people with DS to resemble the traits of animals. For each participant, one correlation was calculated between their 40 trait ratings for chavs and their 40 trait ratings for animals, and another for people with DS and animals. This generated two correlations for each participant (see Table 3). The relationship between each *r* score from this correlational analysis, and each participant's D scores from the ST-IATs was then investigated. A moderate positive relationship was found between participants' chav/animal correlations and chav ST-IAT D-scores ($r(36) = .41$, $p < .01$). Similarly, a positive relationship of moderate strength was determined between participants' DS/animal correlations and DS ST-IAT D-scores ($r(36) = .39$, $p < .01$). Demographics did not influence results; all participants were university students and no significant effect of gender was observed for any findings (all *p*s > .05).

Table 3

Individual participant correlations between traits attributed to chavs and animals, and traits attributed to people with Down syndrome and animals

Participant	Chav/Animal	DS/Animal
1	0.072	0.479**
2	0.231	0.397*
3	-0.159	0.410**
4	-0.012	0.177
5	0.350*	-0.058
6	0.223	0.337*
7	0.104	0.018

8	0.028	0.216
9	0.113	0.084
10	0.114	0.511**
11	0.076	0.275
12	-0.162	0.435**
13	.[a]	.[a]
14	0.551**	0.320*
15	-0.092	0.110
16	0.252	0.338*
17	0.165	-0.129
18	0.358*	0.413**
19	0.131	0.306
20	0.657**	0.642**
21	0.077	0.376*
22	0.537**	0.381*
23	0.545**	0.435**
24	-0.195	0.114
25	.[a]	.[a]
26	0.339*	0.445**
27	-0.215	-0.002
28	0.477**	0.282
29	0.025	0.000
30	0.292	0.374*
31	0.200	0.586**
32	0.638**	0.480**
33	0.206	-0.163
34	0.182	0.292
35	-0.218	-0.074
36	-0.050	0.484**

37	0.172	0.515**
38	0.424**	0.479**
39	-0.025	0.195
40	-0.058	0.405**

Note. [a]cannot be computed as variables are invariant.

*p < .05. **p <.01. N = 40.

Neurological Dehumanization

The pre-processing steps of the EEG data using Brain Vision Analyser 2.1 (2014) can be found in Appendix B and the way in which the electrode sites were divided into eight regions has previously been described in the method section. Figure 3 shows the grand average ERPs of the primary emotion condition across chav, DS and control conditions in one electrode of each of the eight scalp regions plus Cz (the most central electrode). Figure 4 shows the grand average ERPs of the secondary emotion condition across group conditions in each of the eight scalp regions plus Cz.

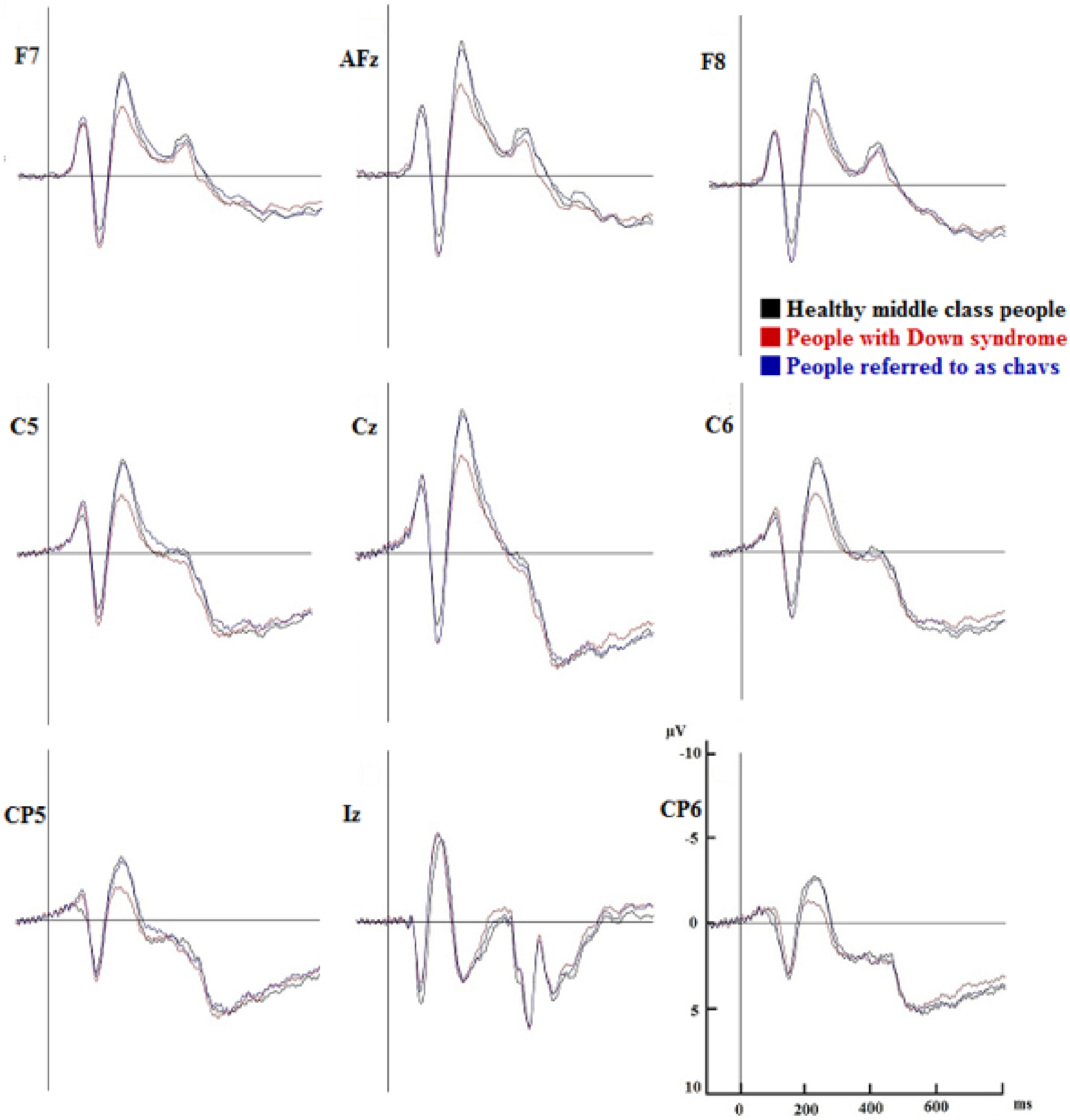

Figure 3. Grand average ERPs within the primary emotion condition in each of the 8 scalp regions.

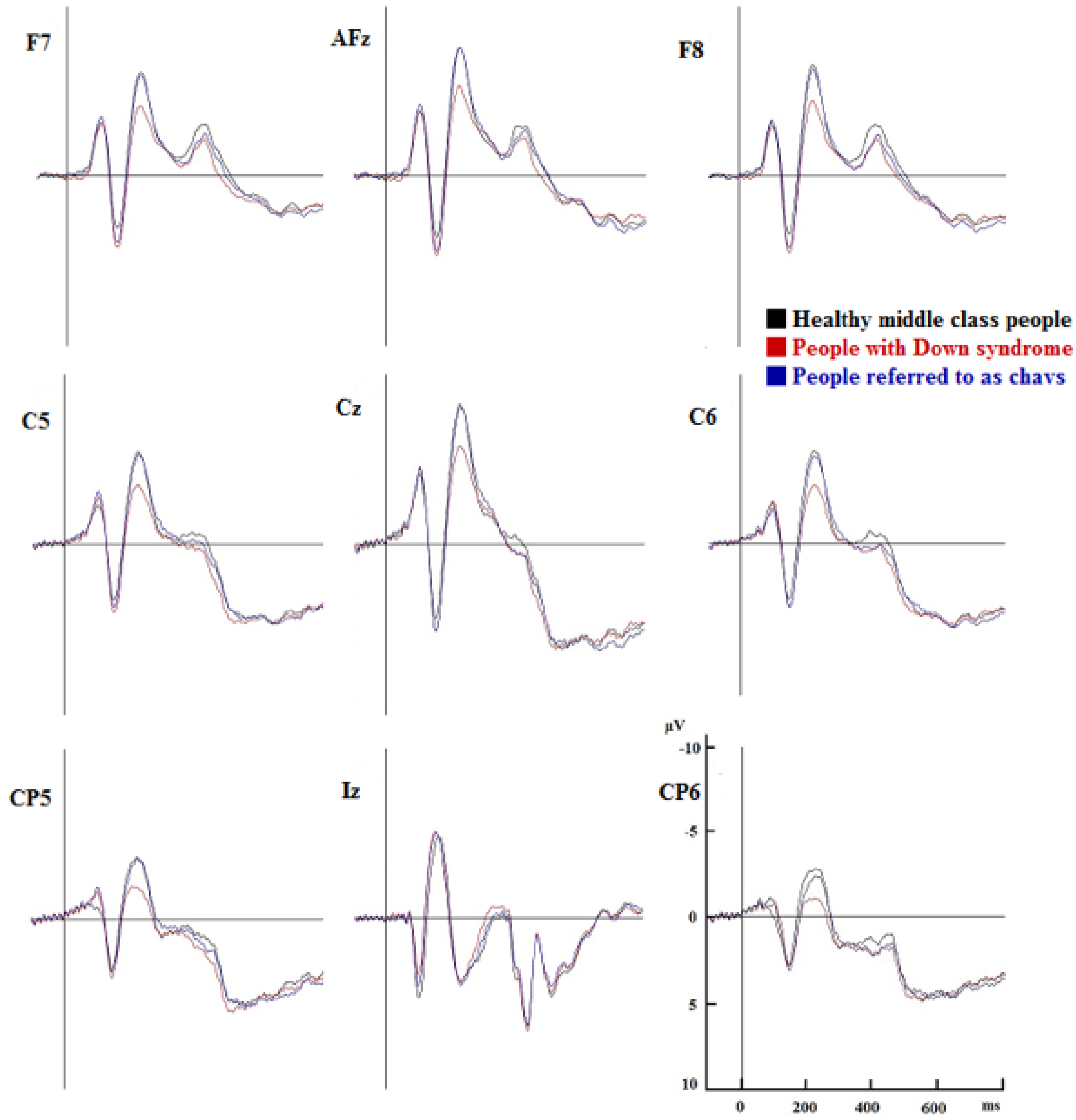

Figure 4. Grand average ERPs within the secondary emotion condition in each of the 8 scalp regions.

200 – 250ms

A 2 x 3 x 8 repeated measures ANOVA was conducted to investigate the relationship between emotion (primary and secondary), group (chav, people with DS, and control), and scalp region (left anterior, left posterior, right anterior, right posterior, left centre, right centre, centre anterior, centre posterior) on the mean amplitude from 200-250ms. Assumptions regarding dependent and independent variables, outliers, normality and sphericity were investigated, and all except the assumption of sphericity were met. Maulchly's test of sphericity indicated that this assumption was violated in relation to group ($\chi^2(2) = 13.1$, $p <$ .001) and in terms of scalp region ($\chi^2(27) = 223.2$, $p < .001$) so degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (ε = 0.66; ε = 0.20). There was a significant moderate interaction between group and scalp region, $F(4.267, 81.066) = 14.83$, $p < .001$, $\eta_p^2 = .44$, indicating that the type of group had a significant effect on the peak amplitudes within different scalp regions (see Figure 5). The simple main effects of the interaction between scalp region and each group indicated more negative peak amplitudes for both chavs and people with DS in comparison to controls in all scalp regions, with people with DS having the most negative peak amplitudes (see Tables 4.1, 4.2, 4.3). There were also significant main effects of group, $F(1.318, 25.047) = 41.08$, $p < .001$, $\eta_p^2 = .684$, and scalp region, $F(1.400, 26.603) = 8.19$, $p < .001$, $\eta_p^2 = .65$. There was no significant effect of type of emotion on the amplitude of the ERPs $F(1, 19) = .226$, $p = .64$ (see Table 5). These findings support the influence of group on peak amplitudes in different scalp regions with no effect of type of emotion.

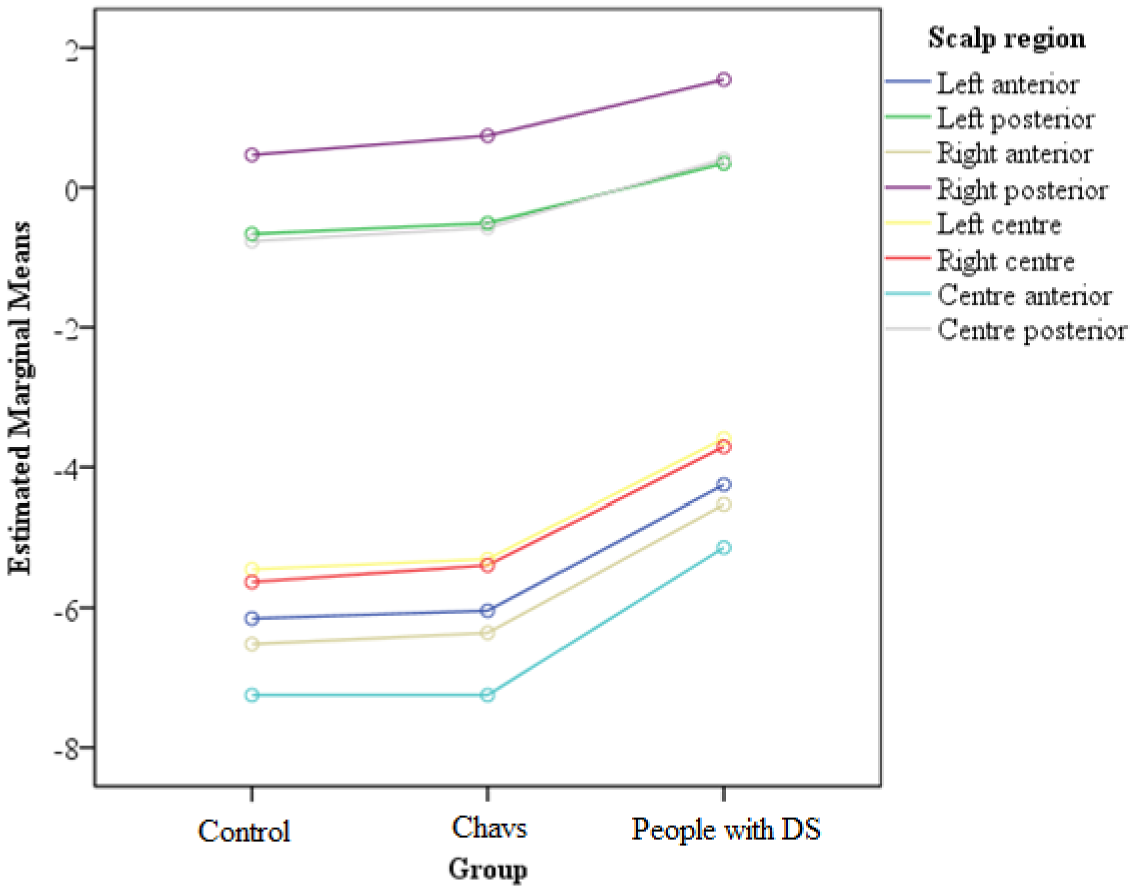

Figure 5. Interaction between group and scalp region within 200 to 250ms.

Table 4.1

Simple main effects of chav condition on scalp region

	Left Anterior	Left Posterior	Right Anterior	Right Posterior	Left Centre	Right Centre	Centre Anterior
Left Anterior							
Left Posterior	-5.49*[b]						
Right Anterior	0.37	5.86*[b]					
Right Posterior	-6.62*[b]	-1.13	-6.97*[b]				
Left Centre	-0.71	4.78*[b]	-1.07	5.91*[b]			
Right Centre	-0.52	4.97*[b]	-0.89	6.10*[b]	0.18		
Centre Anterior	1.10*[b]	6.58*[b]	0.73*[b]	7.72*[b]	1.80*[b]	1.62*[b]	
Centre Posterior	-5.39*[b]	0.10	-5.75*[b]	1.23*[b]	-4.68*[b]	-4.86*[b]	-6.48*[b]

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Table 4.2

Simple main effects of DS condition on scalp region

	Left Anterior	Left Posterior	Right Anterior	Right Posterior	Left Centre	Right Centre	Centre Anterior
Left Anterior							
Left Posterior	-5.53*[b]						
Right Anterior	0.32	5.85*[b]					
Right Posterior	-6.78*[b]	-1.25*[b]	-7.10*[b]				
Left Centre	-0.74	4.79*[b]	-1.06*[b]	6.05*[b]			
Right Centre	-0.65	4.88*[b]	-0.97*[b]	6.13*[b]	0.88		
Centre Anterior	1.21*[b]	6.74*[b]	0.89*[b]	7.99*[b]	1.95*[b]	1.86*[b]	
Centre Posterior	-5.47*[b]	0.07	-5.79*[b]	1.32*[b]	-4.73*[b]	-4.82*[b]	-6.68*[b]

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Table 4.3

Simple main effects of control condition on scalp region

	Left Anterior	Left Posterior	Right Anterior	Right Posterior	Left Centre	Right Centre	Centre Anterior
Left Anterior							
Left Posterior	-4.60*[b]						
Right Anterior	0.28	4.87*[b]					
Right Posterior	-5.80*[b]	-1.20*[b]	-6.07*[b]				
Left Centre	-0.66	3.94*[b]	-0.94*[b]	5.14*[b]			
Right Centre	-0.54	4.06*[b]	-0.82*[b]	5.26*[b]	0.12		
Centre Anterior	0.89*[b]	5.49*[b]	0.61*[b]	6.69*[b]	1.55*[b]	1.43*[b]	
Centre Posterior	-4.66*[b]	-0.06	-4.94*[b]	1.14*[b]	-4.00*[b]	-4.12*[b]	-5.55*[b]

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Table 5

Within subject effects between 200 and 250ms

	df	F	p	η_p^2
Emotion	1.00	0.27	0.640	0.012
Group	1.32	41.08	< 0.001	0.684
Scalp Region	1.40	34.90	< 0.001	0.648
Emotion x Group	1.62	0.09	0.875	0.005
Emotion x Scalp Region	2.10	1.98	0.150	0.094
Group x Scalp Region	4.27	14.83	< 0.001	0.438
Emotion x Group x Scalp Region	5.34	0.73	0.608	0.037

Note. Greenhouse Geisser correction figures; $N = 20$.

Group mean differences indicated a significant difference between chav and DS conditions ($p < .001$), and DS and control conditions ($p < .001$). The differences in scalp region are shown in Table 6. It is evident that, among others, there were significant differences in scalp region between left anterior and left posterior, right anterior and right posterior, and the centre anterior and posterior regions. This indicates an evident difference between anterior and posterior electrode sites within this epoch.

Table 6

Mean differences between eight scalp regions between 200 and 250ms

	Left Anterior	Left Posterior	Right Anterior	Right Posterior	Left Centre	Right Centre	Centre Anterior
Left Anterior							
Left Posterior	-5.21*[b]						
Right Anterior	0.32	5.53*[b]					
Right Posterior	-6.40*[b]	-1.19	-6.72*[b]				
Left Centre	-0.70	4.51*[b]	-1.02	5.70*[b]			
Right Centre	-0.57	4.64*[b]	-0.89	5.83*[b]	0.13		
Centre Anterior	1.06*[b]	6.27*[b]	0.74*[b]	7.46*[b]	1.77*[b]	1.64*[b]	
Centre Posterior	-5.17*[b]	0.04	-5.49*[b]	1.23*[b]	-4.47*[b]	-4.60*[b]	-6.24*[b]

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Explicit and implicit results of the twenty ERP participants' were examined to determine whether they were considered high or low in dehumanization. If participants' explicit trait ratings of chavs and people with DS were positively correlated with that of the animal trait ratings they provided, and/or their D scores on the chav and DS ST-IATs were much lower than that of the control, they were rated as high in dehumanization ($N = 11$), and vice versa ($N = 9$). A significant difference was found between the two groups $t(19) = 12.70$, $p < .001$, 95% CI, [1.21 to 1.69]. A mixed methods repeated measures ANOVA was conducted to investigate whether the previously reported results found in this epoch differed between people with high levels of dehumanization ($N = 11$) and people with low levels of dehumanization ($N = 9$), as uncovered from the explicit and implicit findings. The effect of level of dehumanization was non-significant $F(1, 18) = 1.12$, $p = .30$, $\eta_p^2 = .059$, however from the graph in Figure 6 there was evidently a trend between conditions with participants high in dehumanization having more negative peak amplitudes than people low in dehumanization in all regions except the left posterior. This trend was strongest across centre electrode sites prompting further exploratory research.

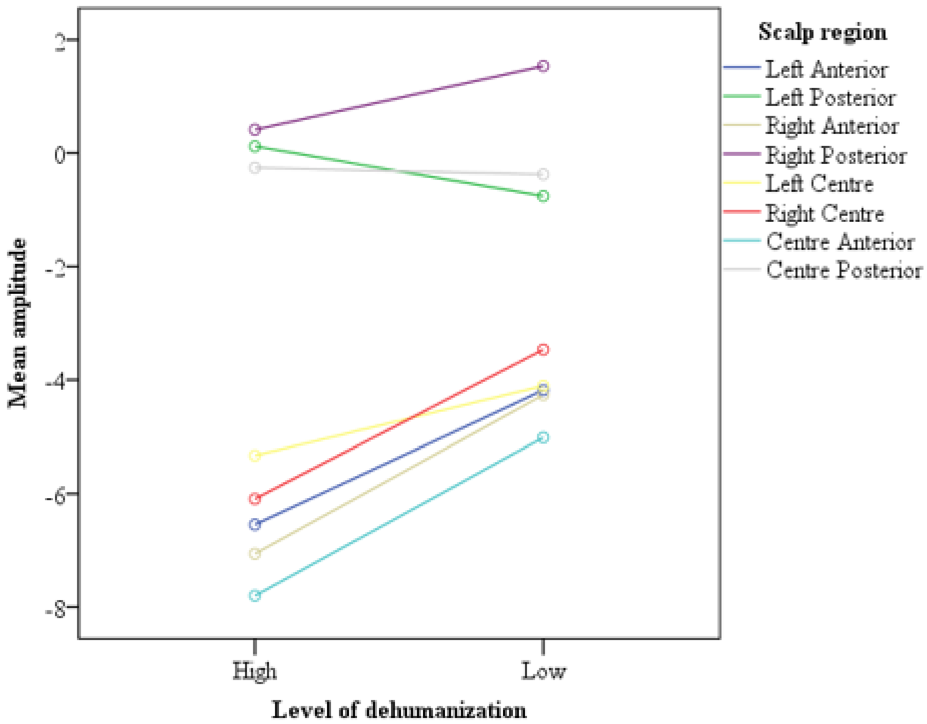

Figure 6. Effect of level of dehumanization (high and low) on mean amplitudes in eight scalp regions from 200ms to 250ms.

Additional exploratory analysis was conducted to investigate the trend noticed in Figure 6. A mixed repeated measures ANOVA was conducted to explore the relationship between the centre electrodes (left centre, right centre, centre anterior and centre posterior), group, emotion and level of dehumanization. This yielded a significant interaction between left and right centre electrode sites and group that was moderated by level of dehumanization $F(1.85, 33.26) = 4.18$, $p = .028$, $\eta_p^2 = .19$ (Figure 7). The simple main effects can be seen in Table 7.1 and 7.2. This implied that level of dehumanization had a moderating effect on the interaction between group and centre electrode sites, with high dehumanizers having larger negative peak amplitudes than low dehumanizers.

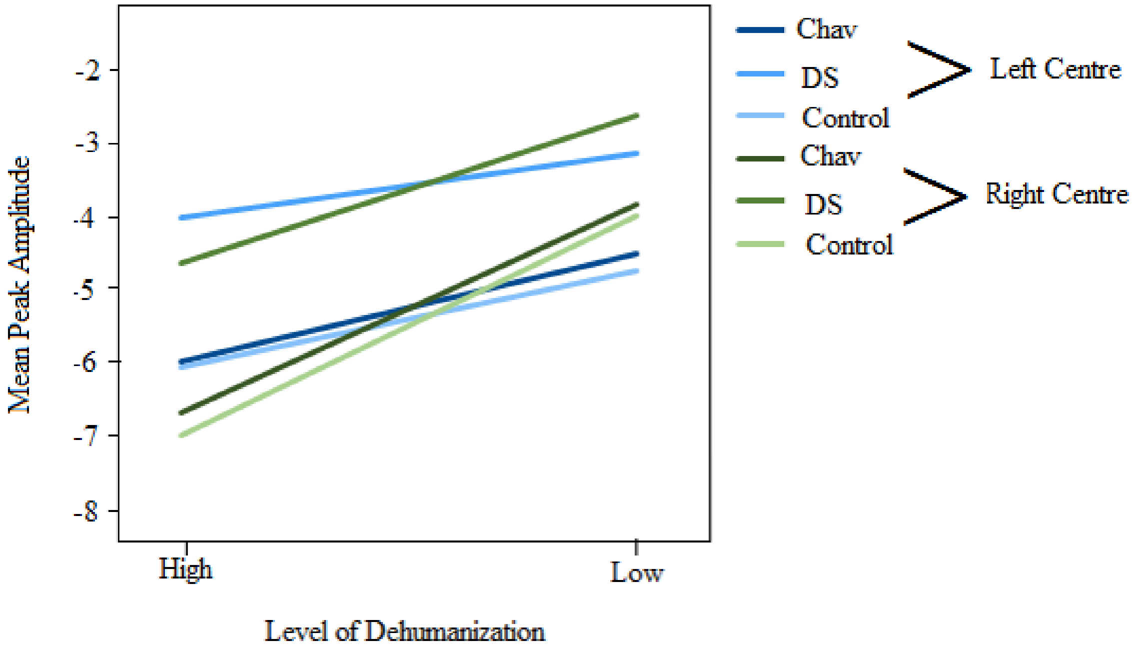

Figure 7. The interaction between group (Chav, people with DS, and Control) and scalp region (Left and Right Centre) moderated by level of dehumanization (High and Low).

Table 7.1

Simple main effects of the interaction between group and left centre electrode sites moderated by level of dehumanization

	High			Low		
	Chav	DS	Control	Chav	DS	Control
Chav	-			-		
DS	1.98*[b]	-		1.39*[b]	-	
Control	0.09	2.06*[b]	-	0.22	1.61*[b]	-

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Table 7.2

Simple main effects of the interaction between group and right centre electrode sites moderated by level of dehumanization

	High			Low		
	Chav	DS	Control	Chav	DS	Control
Chav	-			-		
DS	2.06*[b]	-		1.22*[b]	-	
Control	0.31	2.37*[b]	-	0.16	1.37*[b]	-

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

300 – 500ms

A 2 x 3 x 8 repeated measures ANOVA was conducted to investigate the relationship between emotion, group, and scalp region on the latency and direction of voltage change in the 300-500ms range. Again, Maulchly's test of sphericity indicated that this assumption was violated in relation to group ($\chi^2(2) = 11.35$, $p = .003$) and to scalp region ($\chi^2(27) = 119.04$, $p < .001$) so degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.58$; $\varepsilon = 0.20$). There were no significant interaction effects between emotion, group and scalp region. However, there was a main effect of scalp region, $F(1.43, 14.27) = 7.87$, $p = .009$, $\eta_p^2 = .44$ (see Table 8). Mean differences of scalp region are shown in table 9. It is clear from both figure 3 and 4 that, from 300-500ms, the stimuli created a more negative-going waveform within anterior scalp regions, while at the same time creating a more positive-going waveform at posterior scalp regions.

Table 8

Within subject effects from 300 to 500ms

	df	*F*	*p*	ηp^2
Emotion	1.00	0.54	0.478	0.051
Group	1.32	1.39	0.268	0.122
Scalp Region	1.40	7.87	0.009	0.440
Emotion x Group	1.62	1.37	0.271	0.121
Emotion x Scalp Region	2.10	1.02	0.351	0.093
Group x Scalp Region	4.27	1.51	0.246	0.131
Emotion x Group x Scalp Region	5.34	1.05	0.348	0.095

Note. Greenhouse Geisser correction figures; *N* = 20.

Table 9

Mean differences between eight scalp regions from 300 to 500ms

	Left Anterior	Left Posterior	Right Anterior	Right Posterior	Left Centre	Right Centre	Centre Anterior
Left Anterior							
Left Posterior	-3.76*[b]						
Right Anterior	0.21	3.97*[b]					
Right Posterior	-4.21*[b]	-0.45	-4.42*[b]				
Left Centre	-1.47*[b]	2.29*[b]	-1.68	2.74*[b]			
Right Centre	-1.30	2.46*[b]	-1.51*[b]	2.91*[b]	0.17		
Centre Anterior	-0.02	3.74*[b]	-0.23	4.19*[b]	1.45*[b]	1.28*[b]	
Centre Posterior	-4.33*[b]	-0.57	-4.54*[b]	-0.12	-2.86*[b]	-3.03*[b]	-4.31*[b]

Note. 95% Confidence Intervals

[b] Bonferroni correction for multiple comparisons

* The mean difference is significant at the 0.05 level

Again, a mixed repeated measures ANOVA was conducted to investigate whether results differed due to level of dehumanization. Level of dehumanization failed to reach significance $F(1, 18) = .49$, $p = .49$, $\eta_p^2 = .027$, indicating that level of dehumanization as predicted by the explicit and implicit measures did not have an effect on ERP findings

(Figure 8). In a pattern akin to the results of the 200-250ms epoch, while this level of dehumanization was not significant in explaining the findings of the ERP task, a trend was evident in that the high dehumanization group scored more negatively than the low dehumanization group in all eight regions. This difference between high and low dehumanizers looked to be most prominent in central electrode sites. This would seem to indicate that people high in dehumanization have more negative peak amplitudes across the scalp than people low in dehumanization, especially in central electrodes.

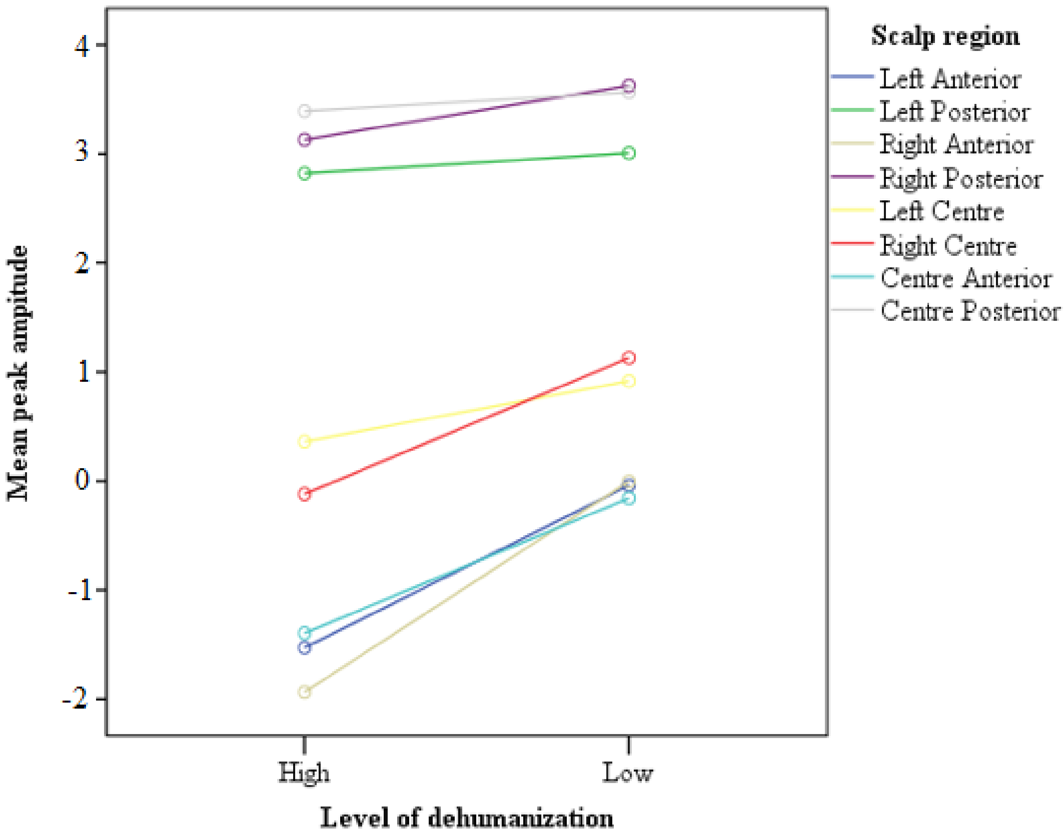

Figure 8. Effect of level of dehumanization (high and low) on mean amplitudes in eight scalp regions from 300ms to 500ms.

Again, an exploratory analysis of the effect of level of dehumanization on the relationship between emotion, group and central electrodes was conducted within this epoch to determine if this effect was significant in specifically the central regions. Results were non-significant, $F(1,18) = 0.32$, $p = 0.58$, $\eta_p^2 = 0.02$, indicating that although there appeared to be a trend across these regions, further analysis on this dataset did not support this notion.

Discussion

The purpose of this study was to investigate whether people with intellectual disabilities and people of low SES are dehumanized when compared with healthy middle-class people.

Findings from the measure of explicit dehumanization were consistent with hypothesis 1. Correlational analyses of the self-report trait ratings, taken by forty participants, indicated that traits attributed to chavs and people with DS were more strongly associated with traits attributed to animals than humans. This supports the findings of Loughnan and colleagues (2014)'s study on people of low SES. These findings imply that chavs and people with DS differ from others in a similar way to the means in which animals are distinguished from humans. This association with animals was stronger for people with DS than chavs. This may be due in part to the nature of the stereotype applied to each group. As previously mentioned both would be subject to dehumanization but for different reasons, while chavs are depicted as uneducated and violent (Jones, 2012), the traits of people with DS are considered more simple and harmless (Rosner, Hodapp, Fidler, Sagun, & Dykens, 2004), thus bringing traits to mind that would be synonymous with different types of animals. Hence, depending on the type of animal in the mind of the participant at the time they completed the questionnaire they may have had very different answers. Future research could employ more specific animal questionnaires, for instance having one related to wild and another related to tame animals, so that a more comprehensive image of animalistic dehumanization may be uncovered.

The results of the implicit dehumanization tasks supported the hypothesis that chavs and people with DS would be dehumanized in comparison to healthy middle-class people. While mean findings across participants from the ST-IATs of chavs and people with DS both indicated that these groups were more strongly associated with the *human* category than the *animal* category, when compared to the mean control ST-IAT findings it was evident that there was a significant degree of difference in "how human" these groups were considered. The implicit association between chavs and humans was almost four times less than that of the implicit findings for the control condition, while the implicit association between the control condition and humans doubled that of DS and this category. Both mean D-scores for chavs and people with DS were significantly different to that of control D-scores. This provided support for subtle dehumanization of these groups.

Interestingly, when looking at individual findings between participants, there was an evident consistency between the explicit and implicit dehumanization measures. Because implicit association tests works outside conscious awareness, it is compelling that the ST-IAT results were positively associated with the correlations between animal/human self-report trait ratings and that of both chavs and people with DS. This portrays a consistency between explicit and implicit measures across participants. Nosek and Smyth (2007) tested several different attitude domains to conclude that explicit and implicit measures hold "related but distinct" attitude constructs (p. 26), hence, it is not unusual for explicit and implicit results to have negative associations, or no significant association at all. Yet Greenwald, Poehlman, Uhlmann and Banaji (2009) found that when explicit and implicit measures were highly inter-correlated, the predictive validity of each was greater. The finding that these results were consistent across participants may be due in part to the nature of the questionnaire. Even in the self-report questionnaire, participants were never overtly asked about their opinions about these groups but only to think about traits in relation to these groups and rate how applicable these traits were to each group. While trait ratings of both chavs and people with DS were positively associated with trait ratings of animals, findings from the ST-IATs suggested that neither group was implicitly associated with animals; they were just considered "less human" than controls. As can be expected, not all participants showed a tendency to dehumanize these groups, so participants were divided into two groups based on these findings. This division proved intriguing, as when explicit and implicit dehumanization results were examined the sample was roughly halved by the groupings; those that were high and those that were low in dehumanization.

In relation to the EEG data, grand average ERPs indicated differences in peak amplitudes between the three groups at different epochs. This difference appeared to be strongest for DS and control conditions across electrode sites. Differences were also evident between chav and both DS and control conditions. The peak amplitude of the chav condition appeared within the first 250ms to be closer to that of the control condition, however after 250ms the peak amplitude seemed to become closer to that of the DS condition. As the N170 is the ERP component associated with face perception this difference between DS and both control and chav conditions within the first 250ms may be due to the differences evident in the physical features of faces of people with DS. Due to differences that were evident between peak amplitude of groups before 250ms and again between 300 and 500ms the segments 200-250ms and 300-500ms were chosen to be examined. This second epoch has also been associated with stereotype research (Hehman et al., 2013; White et al., 2009) hence providing additional motivation to run statistical analysis on amplitudes of this timeframe.

Investigating the effect of type of emotion (primary or secondary), group (chavs, people with DS, or controls) and scalp region (the 64 electrode sites were divided into eight scalp regions) on the mean peak amplitude between 200 and 250ms revealed a significant interaction between group and scalp region. Further investigation of this interaction via simple main effects revealed that the three groups produced significantly different results in different scalp regions, with chavs and people with DS having more negative peak amplitudes than that of controls across all eight regions. This provides support for a significant difference in scalp region that was dependent on group. Post hoc tests showed that mean peak amplitude of the DS condition was significantly different to that of both the chav and control conditions. Again this may be due to the different physical features of the faces of people with DS. Post hoc tests also revealed a significant main effect of scalp region which showed many significant differences in scalp region but most notably between anterior and posterior electrode sites; including left anterior and posterior, right anterior and posterior, and centre anterior and posterior.

Emotion type, group and scalp region were also explored in relation to mean peak amplitude between 300 and 500ms, where a significant main effect of scalp region was shown. Again, anterior and posterior electrode sites yielded different peak mean amplitudes. It was quite evident from the grand average figures that there were clear differences between anterior and posterior electrode sites within this epoch, with a negative-going wave form in anterior regions and a positive-going waveform in posterior regions. In contrast to the unpublished ERP study of Harris et al. that identified a negative going waveform from 300ms onwards in response to groups that elicited disgust, the grand average waveforms for both primary and secondary emotion conditions in this study indicated the opposite pattern for all three groups from 300ms onwards, including chavs who would presumably elicit disgust.

Next, it was investigated whether these results were dependent on levels of dehumanization. As previously mentioned, participants who showed high levels of dehumanization on explicit and implicit measures of dehumanization, and those who showed low levels, were divided into two separate groups. Analyses revealed that the groups did not have a significant effect on the outcome of the previous tests on the 200-250ms and the 300-500ms time segments. However, graphs indicated a trend between the two groups. The group of participants who scored high on dehumanization produced a larger mean peak amplitude than that of those who were deemed low on levels of dehumanization. As already stated, larger N170 amplitudes have been associated with responses to an out-group when participants are particularly prejudiced towards this specific out-group (Ofan, Rubin, & Amodio, 2011). This stronger negative amplitude between 200 and 250ms, found in this study, for people high in dehumanization may support this finding of Ofan and colleagues; however it does not explain the difference in amplitudes between 300 and 500ms. Furthermore, although high dehumanizers produced larger negative peak amplitudes which was in line with Ofan et al.'s study, across conditions the control group produced the largest negative peak amplitude therefore contradicting the study in this regard. Although these findings were not statistically significant, when findings were investigated by level of dehumanization there did seem to be a clear trend in both 200-250ms and 300-500ms epochs, especially in central scalp regions. As there were 20 participants for the ERP task, 11 high and 9 low in dehumanization, this leaves a very small sample size to find a significant result between the two groups. Perhaps with a larger sample size a significant result may have been found between both groups; a suggestion for future research.

This aforementioned trend present as a result of level of dehumanization sparked further exploratory research to be conducted. As this trend was most notable in central electrode sites, the effect of level of dehumanization on the relationship between emotion, group and central scalp regions was examined. Findings of this exploratory research pointed to a significant moderating effect of level of dehumanization on the relationship between group and left and right centre scalp regions in the 200-250ms epoch, but not the 300-500ms epoch. This particular analysis was exploratory and thus prone to type 1 error, yet it indicates potential for future research. That level of dehumanization between participants could have a significant moderating effect on the interaction between group and central electrode sites in this epoch promotes the claim that this is not just an N170 effect. This provides more support for the findings of Ofan and colleagues (2011) that people higher in level of dehumanization produce larger negative peak amplitudes, yet this was across all three groups, and in fact the control group was again the group with the largest negative going waveform.

This study was not without its limitations. First of all, images with appropriate licensing were obtained from both Flickr™ and Google Images, and due to the nature of the different groups under investigation in this study it proved exceedingly difficult to find enough images of faces from each group that conveyed the emotions that were being studied.

For this reason, images of faces with neutral expressions were gathered and the emotion word written across the face of the image. Ideally original stimuli using both male and female people from each of the three groups conveying each of the four emotions would have been created. This may have elicited more clear results in terms of the ERP study. The emotion-based approach did not seem to have an effect on results, however, maybe future research which employed this suggestion regarding original images would glean more promising results.

Additionally, the study looked at dehumanization of people of low SES and people of intellectual disability from the point of view of a student sample in the University of Edinburgh. The control group was intended to be the most relatable group to participants. While participants were not considered chavs, or did not have DS, it therefore would not be unrealistic to assume that they would have related more strongly with healthy middle-class people, yet there were no tests conducted to ensure this. It would have also been fascinating to have conducted the study with people referred to as chavs, and with people who have DS, in order to uncover whether similar results could be found from these groups in relation to their in-group in support of the statement that both dominated and dominating groups dehumanize the other (Kelman, 1976; Leyens et al., 2001).

To summarise in relation to hypotheses, chavs and people with DS were ascribed traits that were considered to be more applicable to animals than humans, as predicted. Implicit tasks revealed that overall chavs and people with DS were more strongly associated with humans than animals. But when compared with controls, it was evident that both chavs and people with DS were dehumanized, as hypothesized. While a particular ERP component was not uncovered in relation to the emotion-based approach to dehumanization, there was an effect of group on mean peak amplitudes across scalp regions within the first 250ms. There was also an evident difference between anterior and posterior electrodes, especially in 300-500ms epoch. Overall, stimuli of both chavs and people with DS elicited larger negative ERP peak amplitudes than control stimuli, while at the earlier epoch DS stimuli produced a much larger negative ERP peak amplitude than both chav and control stimuli. Further research with original stimuli and a larger sample size is suggested for improved interpretation.

In brief, these results are in line with previous findings that people of low SES fall victim to dehumanization, while additionally providing support for the claim that people with intellectual disabilities are dehumanized in comparison to healthy middle-class people. This research adds to the growing number of studies, mentioned previously, investigating dehumanization at a more relatable level. In addition to the implications of this study, the findings reveal potential for further ERP research regarding dehumanization using methodologies that focus on particular dehumanization approaches. This research furthers the notion that equality and respect are still imbalanced both between and within societies and the nature of subtle dehumanization seems to have become standard thinking within. It is important to recognise that treating others as less than human does not occur in solely palpable ways across nations, ethnicities and religions, but exists too in regular aspects of society such as socio-economic status systems, and in relation to aspects as immutable to identity as intellectual disability.

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Appendices

Appendix A. Explicit dehumanization questions.

Block 1. Please think about humans and animals, and how they differ. Consider each of the following attributes and rate whether it is more characteristic of animals, more characteristic of humans, or equally characteristic of both.

1. More characteristic of animals
2. Slightly more characteristic of animals
3. Equally characteristic of both human and animals
4. Slightly more characteristic of humans
5. More characteristic of humans

Block 2. Please think about the condition of Down syndrome. Consider each of the following attributes and rate whether it is more characteristic of a person with Down syndrome, or more characteristic of a person who doesn't have the condition, or equally characteristic of both.

1. More characteristic of someone with Down syndrome
2. Slightly more characteristic of someone with Down syndrome
3. Equally characteristic of someone with or without Down syndrome
4. Slightly more characteristic of someone without Down syndrome
5. More characteristic of someone without Down syndrome

Block 3. Please think about a person of low socio-economic status, in particular a person described as a "chav". Consider each of the following attributes and rate whether it is more characteristic of a chav, or more characteristic of a person who is not considered a chav, or equally characteristic of both.

1. More characteristic of a chav
2. Slightly more characteristic of a chav
3. Equally characteristic of both chavs and non-chavs
4. Slightly more characteristic of non-chavs
5. More characteristic of non-chavs

Appendix B. ERP pre-processing.

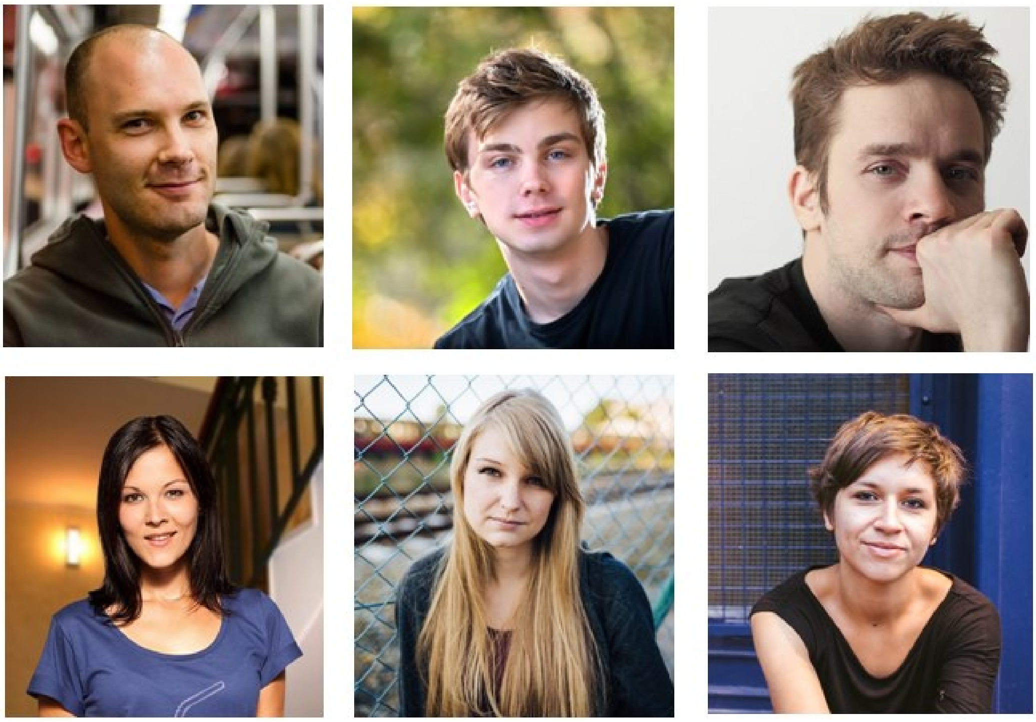
Brain Vision Analyser 2.1 (2014) was used for pre-processing of the EEG data. The raw EEG data was examined to identify eye movements and other artefacts within each participant's data set. The data was then re-referenced to the two mastoid electrodes behind the ear (EXG1 and EXG2). The data was filtered using a high-pass filer, low-pass filter, and a notch filter. The frequencies were kept between 0.1Hz and 30Hz. The notch filter filtered any 50Hz noise that was present due to power supplies. If necessary, spherical spline interpolation was carried out on excessively noisy electrodes. The data was segmented based on the 48 marker positions of the various stimuli. The segmented window was from 100ms before stimulus onset to 1,200ms after stimulus onset. Ocular correction was conducted on the data using a Gratton & Coles method. A VEOG channel was made to account for vertical eye movement (EXG5 & EXG6), and a HEOG channel was made to account for horizontal eye movement (EXG3 & EXG4). Baseline correction was applied to each segment at -100ms to 0ms. Artefact rejection was then conducted to reduce noise created by artefacts such as body movement and muscle tension. Amplitude minimum was set to -100uV and maximum was set to 100uV. These pre-processing steps were applied to all 48 segments within the 23 participants. An average ERP was then generated per stimulus per subject. Each of the 48 averages per subject were examined to ensure that more than 60% of the trials were retained after pre-processing. Due to low trial counts after pre-processing the data of three participants was removed. Grand averages were then computed for primary and secondary emotions within the chav condition, the DS condition and the Control condition.

Appendix C. ST-IAT stimuli

Stimuli for Chav ST-IAT.

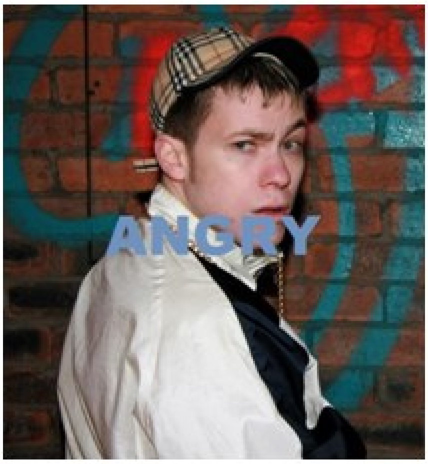
Stimuli for DS ST-IAT.

Stimuli for control ST-IAT.

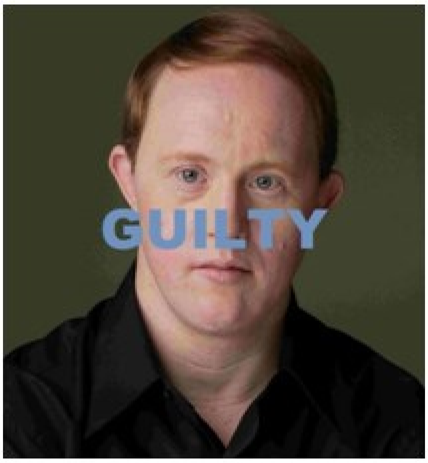


Appendix D. Pilot ERP task stimuli

Stimuli for chav condition.



Stimuli for DS condition.



Stimuli for control condition.

Appendix E. ERP task stimuli

Stimuli for chav condition.

Stimuli for DS condition.

Stimuli for control condition.

Note. Each image was copied four times so that every face had each emotion word written on it. Only one example per image is shown here.

Appendix F.

Participant Information Sheet

Do we dehumanize people with intellectual disabilities and people of low socio-economic status? A study of self-report, implicit, and neurological dehumanization.

You are invited to take part in a research study on dehumanization of people with intellectual disabilities, specifically Down syndrome, and people of low socio-economic status, specifically the group widely referred to in literature and news programmes as "chavs". Dehumanization involves denying uniquely human attributes or aspects of human nature to others.

The aim of this study is to investigate whether people with Down syndrome and people referred to as chavs are dehumanized, using self-report, implicit and neurological measures. This study builds on previous research in the area of the dehumanization of chavs, and looks into a relatively under examined domain of whether people with intellectual disabilities, such as people with Down syndrome, are dehumanised to any extent.

What will happen?

The study has three parts. Firstly, you will be asked to fill in a questionnaire which involves answering questions regarding emotions on a 5 point Likert rating scale.

You will then take part in three implicit association tests. Implicit association tests look at unconscious associations between two objects, attributes or groups. These tasks involve assigning words or pictures to categories. Category names will be shown on a computer screen, words or pictures associated with one of the categories will appear on screen one at a time and you will indicate via a button press the correct category for this word or picture. Instructions will appear on screen as you begin the task and there will be a trial block.

Finally, you are asked to take part in an ERP study. This will involve looking at images and words and answering simple questions, again via button presses, while an EEG is carried out. Again, instructions will appear on screen as you begin the task. An EEG involves measuring the electrical activity of your brain. This is measured by attaching electrodes to your scalp, which are then connected to a computer. Your brain activity will be recorded while you are performing the task and while you are resting. You will be asked to sit still during the entire measurement, since movements will interfere with data collection. You will be given a cap to wear on which the electrodes can be attached. To achieve a good signal transmission, some electrolyte gel will be rubbed onto the scalp through each electrode. You will be able to wash your hair after the experiment if you so wish.

Time commitment

The study will take no longer than three hours, including time to set up the EEG.

Participants' rights

You may decide to stop participating in this research study at any time without explanation. You have the right to ask that any data you have supplied to that point be withdrawn/destroyed. You will still be paid for your contribution.

You have the right to omit or refuse to answer or respond to any question that is asked of you.

You have the right to have your questions about the procedures answered (unless answering these questions would interfere with the study's outcome). If you have any questions as a result of reading this information sheet, you should ask the researcher before the study begins.

Benefits and risks

There are no known risks of any of the procedures that will be used in your assessment. Some people experience mild discomfort whilst wearing the cap during the EEG. In rare cases this may cause a headache. Within the EEG experiment, you will be asked to blink and move your head and eyes as little as possible as these processes affect the recording of the electrical signals. This may become tiring, but sufficient breaks are given to rest your eyes.

Cost, reimbursement and compensation

You will receive £20 in return for your participation.

Confidentiality/anonymity

The data we collect do not contain any personal information about you. No one will link the data you provided to the identifying information you supplied (e.g., name, age, occupation). Your name will not be used in the reporting of this data or in any presentations or publications.

For further information

Dr. Stephen Loughnan will be glad to answer your questions about this study at any time. You may contact him via phone: 0131 650 9861 or email: steve.loughnan@ed.ac.uk