Learning to be streetwise: The acquisition of accurate judgments of aggression

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Abstract

The detection of a potential danger is an important factor in avoiding harm. This is even more important for vulnerable populations, such as children. We explored whether children could recognise the potential for a dangerous encounter from observing the walk of an approaching person. Participants were divided into three age groups; over 18 year olds, 16-17 year olds and 13-15 year olds. Participants made judgments of nine, point light presentations of people walking on a treadmill. Ratings of intimidation made by participants were used to assess their ability to detect the walkers' trait aggression. The ability to accurately detect trait aggression increased with age as did the consistency in ratings between individuals within the same age group. We highlight the importance of experiential learning in the acquisition of aggression detection skills.

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Children are frequently told to avoid strangers in general, but there is evidence that young children learn the 'stranger danger' message without putting it into practice, even in a laboratory setting (Moran, Warden, Macleod, Mayes & Gillies, 1997). It is difficult for a child to develop the ability to avoid dangerous adults as most children are not routinely exposed to high risk street danger. Children are usually accompanied by a parent who will make judgments about a potential threat. In fact, becoming a parent heightens adults' perceptions of the formidability of unknown people (Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014). This suggests that children have even less of a responsibility to detect potential aggressors as their parents will be overly cautious on their behalf. Over the past two decades, parents' fear of strangers has led to less freedom for children (Foster, Villanueva, Wood, Christian, & Giles-Corti, 2014). For example, there has been an increase in the percentage of children accompanied on journeys to and from primary and secondary school (Shaw et al., 2013). With children becoming increasingly sheltered by their parents, it is of interest to investigate the ability of young people to detect potential aggressors.

Given the importance of efficiency in detecting potential dangers, it is no surprise that adults make judgments based on simple heuristics such as 'masculine is dangerous'. This heuristic is well established in research that reports a relationship between facial masculinity and judgments of malevolent attributes (Carré, McCormick & Mondloch, 2009; Hehman, Flake & Freeman, 2015; Hehman, Leitner & Gaertner, 2013). What is rated as more masculine appears more dangerous, aggressive and intimidating.

Past research into judgments of danger has primarily focussed on static images of faces (e.g. Carré, et al., 2009; Hehman, et al., 2015; Hehman, et al, 2013). In reality, judgments are likely to start being formed at a distance meaning that facial cues are absent. At this range, other information will be available such as body shape and the movements of a

potential aggressor. In fact, research has demonstrated that gait is an important factor in making accurate judgments of trait aggression (Satchell, 2015).

Funder's (1999) Realistic Accuracy Model (RAM) suggests that a target person affords a perceiver *relevant* and *available* cues to *detecting* personality traits. It has been preliminarily shown that gait is a *relevant* and readily available cue to trait aggression (Satchell, 2015). The *availability* of gait to a perceiver is notable as walking behaviours can be seen even in impoverished situations including at a distance or at night. This allows a judgment of a potential aggressor to be made earlier (e.g. in situations when time for avoidance behaviour is, or is at least perceived to be, limited, McNaughton & Corr, 2004).

However, as the RAM suggests, different perceivers may *utilize* (Funder, 1999) these cues in different ways. Costall (1995) notes that the understanding of affordances (in this case interpersonal affordances) may be culturally driven; "a child, for example, is not simply left to 'discover' the function of a cup or spoon; rather the learning situation involves careful structuring" (p.472). We suggest that Costall's comments on the social and cultural understanding of affordances from objects could also be used to understand age and cultural effects on the utilization of interpersonal affordances in the RAM. Just as a child learns the meaning of a spoon in a structured environment, so might the child learn the risk factors in the gait of an adult. We were interested in how the same gait information is utilized, by perceivers of different ages, to make intimidation judgments. These judgments may or may not reflect the walkers' trait aggression. Funder (2012) refers to interpersonal judgments that relate to the self-reported traits of another as 'accurate' judgments, and we adopt the same term here.

We chose to use point light walkers as stimuli as this format of stimuli allows us to present gait cues and some body shape information, without facial characteristics or clothing of targets influencing judgments. Children as young as 5 years old have been shown to

recognise point light stimuli as human (Pavlova, Krägeloh-Mann, Sokolov, & Birbaumer, 2001) and children as young as 35 months have been able to correctly identify point light motion as gait (Golinkoff et al, 2002) demonstrating that even the youngest participants in our sample (13 years) were able to engage with the task. Further, we specifically target teenage participants as they are increasingly independent at this stage in their lives (although young teenagers [i.e. 13 years old] can be considered to be children). Whilst they may have previous experienced supervision from their parents (Foster et al., 2014), this is the critical age where these individuals are now having to make more decisions for themselves and these decisions (especially of intimidation) are more consequential. It should also be noted that younger teenagers' social perceptions are generally under researched (or focuses on bullying; Boulton & Smith, 1994; Mynard & Joseph, 1997) and as such our literature review is based on younger children and older adults.

We explored the use of a 'masculine is dangerous' heuristic on participants' judgments of intimidation. It was expected that all participants would use the 'masculine is dangerous' heuristic with more masculine bodies judged as more intimidating. However, the main aim of the current study was to investigate the effect that age had on the accuracy of intimidation ratings in detecting trait aggression. Whilst we expected adults would outperform younger participants, we had no firm expectations in terms of the younger participants' accuracy.

Method

Participants. Eighty-five school children (46 females) were recruited for an 'under 16 years' age group (13 years to 15 years, M_{Age} = 14.40 years, SD_{Age} = .73 years). One hundred and three college students (82 females) were recruited for a '16-17 years' age group (M_{Age} = 16.42 years, SD_{Age} = .50 years). Fifty-four undergraduate university students were

recruited for an ‘over 18 years’ age group (44 females, M_{Age} = 21.15 years, SD_{Age} = 3.21 years).

Materials. The walkers were presented in ‘point light’ format. That is to say that the walkers were presented as 13 green dots on a black background (see Figure 1). The walkers were filmed with retroreflective markers placed on both heels, both knees, both greater trochanters (in effect, hips), both shoulders, both elbows, both wrists and their foreheads to capture their gait. We filmed the individuals walking at their preferred walking speed for 10 seconds using Qualysis point light filming technology and ten ProReflex infrared cameras (100 Hz).

We created our own Sexual Dimorphism Index (SDI) score was calculated for each walker using their biometric information. The SDI score was a measure of how masculine-typical the walkers’ bodies were relative to the other walkers in our study. The SDI scores were derived as a function of three sexually dimorphic features (waist-to-hip ratio, shoulder-to-hip ratio and height) and comprised a ranked score of 1-23. A higher SDI score implied more typically masculine morphology; a taller, broader shouldered, broader waisted (‘tubular’) individual. All participants with an SDI score lower than 13 were female.

For the purpose of keeping the experiment efficient and retaining the attention of the younger participants, a sub-set of nine walkers (from a database of 23 walkers) were chosen for use in this study. These nine walkers (M_{Age} = 20.56, SD_{Age} = 2.07) were chosen to represent different ends of the SDI spectrum due to the previously observed relationship between masculinity and perceptions of danger (Carré et al., 2009; Hehman, et al., 2015; Hehman, et al., 2013). Three walkers were chosen as the most masculine (all male, SDI=>21), three as the most feminine (all female, SDI<=3) and three were the median-most values (two female, SDI=11 and 12 and one male, SDI =13).

Walkers completed the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), which we analysed using revisions suggested by Bryant and Smith (2001). This questionnaire was used as it is a well-established measure of participants' tendencies to aggression. The questionnaire has been shown to be a valid measure of current aggression (Bryant & Smith, 2001), aggression in a hypothetical context (Archer & Webb, 2006; O'Connor, Archer & Wu, 2001) and historic aggression (Diamond, 2006) and has been used with both student (García-León et al., 2002) and forensic (Diamond, Wang & Buffington-Vollum, 2005) populations. We only used the 'trait physical aggression' measure of the Buss-Perry Aggression Questionnaire as this is most relevant to interpersonal threat judgments. In accordance with Bryant and Smith's (2001) revisions, participants could score between 3 and 21 for the physical aggression measure and our sample of 9 walkers were well spread (for an undergraduate student sample) within this range of potential aggression scores ($M_{Aggression}$= 7.11, $SD_{Aggression}$= 5.09, $Min_{Aggression}$= 3, $Max_{Aggression}$= 15).

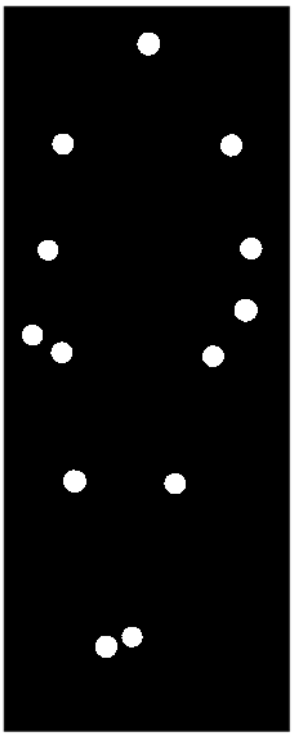

Figure 1. A screenshot of a point light walker used in this experiment. Note; participants observed Green dots on a black background.

Procedure.

The younger participants took part in small groups (sessions of 15-29 participants held in schools and colleges) and the older participants in one larger group (54 participants in a lecture setting.) The order of presentation of the nine walkers was randomised for each group. After the presentation of each walker, the participants were given as much time as they required to make ratings, on 9-point Likert scales, of how *intimidating-not intimidating*, *friendly-unfriendly* and *masculine-feminine* they thought each walker was.

Analyses.

Using the procedures described in previous publications (Brand & Bradley, 2012; Kolar, Funder & Colvin, 1996; Monin & Oppenheimer, 2005) we analysed our data in two ways, using correlated averages and average correlations. Firstly, we analysed the correlation between average intimidation rating received by the walker and the body shape and trait aggression of each walker. This allowed for examination of the accuracy of the age groups in judging a potential aggressor as intimidating (see the results section 'Ratings received by walkers'). Using this analysis is informative as it provides information about the collective accuracy of the sampled populations. However, detail is lost in terms of individual variation in accuracy. Furthermore, the statistical N for analysis is reduced to 9 (as the properties of 9 walkers are correlated with each other), thus not being reflective of the sample size used in this research. Therefore, we also report the accuracy of our individual participants (as measured by Pearson's r values). We calculated participant accuracy by correlating the nine intimidation ratings made by each participant (relating to each of the nine walkers) with the self-reported aggression of the nine respective walkers. This individual accuracy correlation can be interpreted like any correlation, with a score of 1 demonstrating high accuracy (e.g. more aggressive targets are perceived to be more intimidating), a score of -1 demonstrating

high inaccuracy (e.g. more aggressive targets are perceived to be less intimidating) and a score of 0 demonstrating no relationship between trait aggression and intimidation ratings (random performance).

It was therefore possible to examine the distribution of participant accuracy across the sample and the differences in accuracy abilities across age groups (see the results section 'Accuracy of participants'). Reporting the results for collective age groups and at an individual level provides a more complete understanding of both the properties of our walkers and the judgments of our participants.

Results

Ratings received by walkers.

In this part of the results section we focus on the walkers; using the average intimidation rating received by each walker, each walker's trait aggression and each walker's body masculinity (SDI score). The SDI ranking of the walkers positively correlated with the average intimidation rating received by the walkers for all participant age groups (13-15 years, $r(9)=.78$, *95% CI* [.43, .96], $p= .014$; 16-17 years, $r(9)=.77$, *95% CI* [.34, 1.00], $p=.015$; over 18 years, $r(9)=.89$, *95% CI* [.65, .99], $p=.001$) with very strong effects. This implies that in all cases there was a 'masculine is dangerous' heuristic being used by participants to judge the walkers' intimidation. This heuristic was reasonably accurate in itself for this set of walkers, with body masculinity and trait aggression positively correlating with a medium effect ($r(9)=.64$, *95% CI* [.04, .95], $p=.064$).

The average intimidation ratings the walkers received from the younger samples did not significantly correlate with the walkers' trait aggression (13-15 years, $r(9)=.36$, *95% CI* [-.24, .77], $p=.341$; the 16-17 years, $r(9)=.40$, *95% CI* [-.16, .91], $p=.281$). However, the average ratings received by the walkers from the over 18 year olds were positively correlated with trait aggression with a large effect ($r(9)=.70$, *95% CI* [.12, .97], $p=.036$).

It is interesting to note the variance in intimidation judgments made by participants in each of the age groups. Consistency in judgments received by the walkers reflectsparticipants rating a construct they could easily identify. Variance in judgments demonstrates more guess work or a lack of consensus about the matter being judged. By calculating the average standard deviation (σ) in intimidation ratings received by each walker we were able to test for differences in spread of intimidation judgments between the age groups. We found that the variation in intimidation ratings differed between age groups ($F(2,16)=8.81$, $p=.003$, $f^2=.70$) with the responses given by the under 16 year olds being more varied (having the highest σ, $M_\sigma=2.02$, $SD_\sigma=.10$) than those given by the 16-17 year olds ($M_\sigma=1.88$, $SD_\sigma=.12$, $p=.046$, $d=1.32$) and those given by the over 18 year olds (having the lowest σ, $M_\sigma=1.73$, $SD_\sigma=.22$, $p=.003$, $d=1.75$). The over 18 year olds and 16-17 year olds did not differ meaningfully ($p=.09$, $d=.89$). These results imply that a social consensus in judgments of intimidation develops with age.

Accuracy of participants.

In this part of the results section we draw comparisons between the three age groups, using the accuracy correlations (r) of each participant as dependent variables (where 1 is perfect accuracy, -1 perfect inaccuracy and 0 random responding). On average, all age groups only achieved a small to medium level of accuracy ($M_r=.20$, 95% *CI* [.15, .23]). See figure 2(a) for the distribution of the whole sample's performance. In fact, a binomial test showed that the majority of 13-15 year olds (81%, p<.001), 16-17 year olds (66%, p=.001) and over 18 year olds (89%, p<.001) had an accuracy correlation greater than zero, demonstrating overall accuracy. Few participants were notably inaccurate, with only 27 participants (11.16% of the whole sample) having an accuracy value less than -.20 (19 of whom were in the 16-17 year old condition). There was no overall correlation between age of participant and accuracy ($r(241)=.11$, 95% *CI* [-.01, .23], $p=.11$). However, there were

differences in accuracy when accuracy correlations were compared across age groups (F(2, 238)=4.18, p=.016, f=.19). The over 18 year olds (M_r=.30, 95% CI_r [.23, .37]) were, on average, the most accurate in their intimidation ratings (more accurate than the under 16 year olds (M_r=.15, 95% CI_r [.08, .22], p=.01, d=.45) and the 16-17 year olds (M_r=.18, 95% CI_r [.13, .24], p=.004, d=.45). The 16-17 year olds and 13-15 olds performed similarly (p=.47, d=.10), see figure 2(b) for the distribution of performance by age categories.

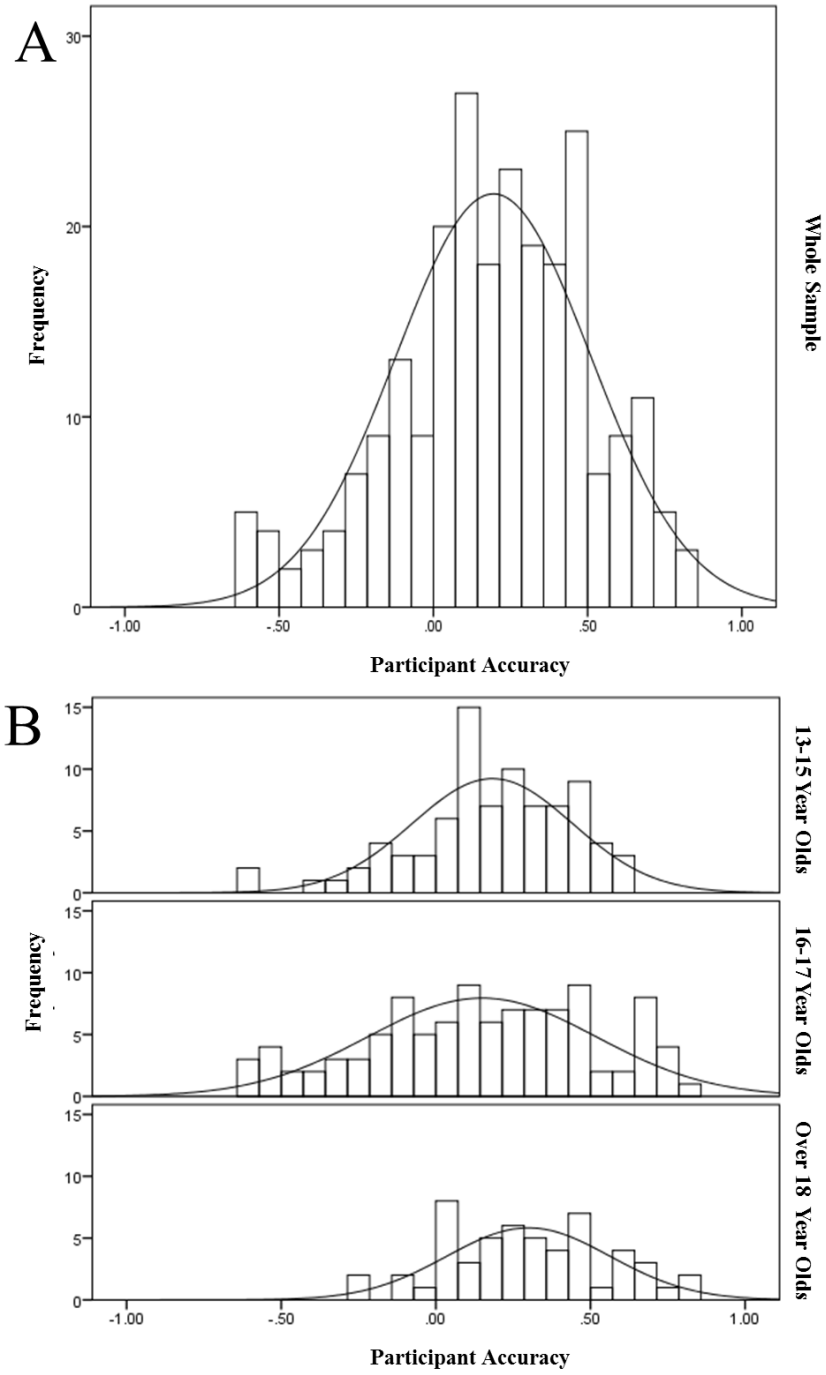

Figure 2. The distribution of participant accuracy in detecting trait aggression with intimidation ratings. Figure 2(a) demonstrates the overall sample accuracy and 2(b) separates out the participants by age category.

Discussion

It is important for the recognition of potential aggressors to happen not only quickly but also accurately. It is possible that younger people do not have the life experience to detect potential dangers. In the current study we explored how accuracy in detecting potential aggressors develops with age. Participants were shown point light displays of targets. No facial characteristics or clothing were present in these videos, however gait and body shape information was available. All our participants, regardless of age, assumed that what is 'masculine is dangerous' and rated walkers with more masculine-typical bodies as more intimidating. When evaluating the accuracy of our participants we found that the older participants outperformed the younger participants in terms of their ability to detect trait aggression. In fact, all participants under the age of 17 performed similarly and were less accurate than those even a couple of years older (the over 18s group). Out of interest we analysed the spread of intimidation ratings. As the age of participants increased, there was a decrease in the amount of variation in the judgments they made of the walkers.

These findings suggest that engaging in a more adult lifestyle exposes individuals to more situations which allow for aggressor detection skills to develop. Furthermore, with age, comes a social consensus regarding perceptions of intimidation. Importantly, the utilisation of this consensus seems to benefit the identification of potential aggressors. These findings contribute to our argument that accurate judgments of aggressors may be acquired through the socialisation of interpersonal affordances. Individuals' *utilization* (Funder, 1999) of gait affordances to make an accurate intimidation judgment may develop through engagement with a social world (Costall, 1995).

Our study used an under researched population; 13 to 17 year olds. There is a lack of interpersonal perception research on this population who are not typically recruited in studies of 'children' and are younger than the typically studied 'adult' population (e.g. Cheek, 1982;

Funder, 2012; McCrae, 1982; Vazire & Mehl, 2008). Research on interpersonal perceptions of teenagers almost entirely focuses on bullying (Boulton & Smith, 1994; Mynard & Joseph, 1997) and does not investigate *accuracy* of trait recognition. It is clear from the individual variation in accuracy for our under 18 year olds that although, as a group, they were poorer at identifying potential aggressors than their adult counterparts, some of the younger participants could detect trait aggression in others. In fact some teenagers outperformed some adults. Future research should further investigate the factors that influence the acquisition of interpersonal accuracy.

It could be the case that the younger participants were less accurate, simply due to the age difference between the participant and the target. Whilst the oldest group were judging targets in the same age bracket, the youngest groups were judging targets who were older than them. It could be suggested that, much in the same way there is an Own-Age Bias in face recognition (see Rhodes & Anastasi, 2012), there could be an Own-Age Bias in threat recognition. This could account for the general poor accuracy in the younger participants and perhaps further research could explore own-age intimidation targets. Here, we specifically targeted adult age targets, as we were interested in children's ability to perform at an adult task (such as those done by; Carré, et al., 2009; Hehman, et al., 2015; Hehman, et al., 2013).

Past research has fundamentally ignored the child as an active participant in judging danger. Studies have focused only on parents' perceptions of the formidability of strangers (Fessler et al., 2014) and their choice to supervise their children closely (Foster et al., 2014). It is important to study how children acquire the skills to detect legitimate dangers. When out with their parents, children may well contribute to the decision to avoid or approach an unknown (or even known) person. In the current study, instead of considering parents' perceptions of their children's ability to 'manage' danger, we asked children themselves to make judgments. Further research should extend this methodology and should consider

children as active participants in detecting dangers. Observations of joint decision making between children and their parents might reveal how parents teach their children to recognise potential aggressors. This would add further weight to our finding that children's acquisition of this ability develops over time.

The current study presented participants with people in motion using point light displays. Whilst previous research has focused on static facial stimuli (Carré et al., 2009; Hehman, et al., 2015; Hehman, et al., 2013), the current work demonstrates that gait alone is communicative enough of trait aggression. Gait is frequently *available* (Funder, 1999) from an approaching person and should be considered part of the overall impression when investigating aggression detection in real world contexts.

Conclusion. The current work has strong theoretical and applied implications. We demonstrated that the ability to use intimidation ratings to discriminate between more and less aggressive individuals is acquired with age. It seems that children learn to recognise the traits of others as they gain life experience. As children growing up in the 21st century are more sheltered than ever before by their parents it is interesting that not until the age of 17, when venturing further afield, do children become better able to accurately detect aggressors.

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