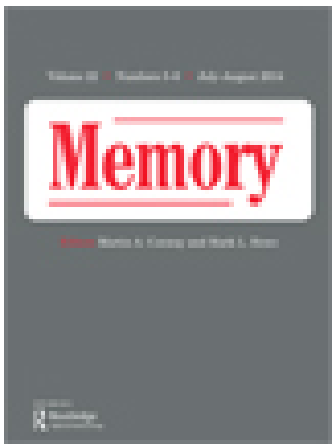

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Influences of appearance-behaviour congruity on memory and social judgements

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Influences of appearance-behaviour congruity on memory and social judgements

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Prior work shows that appearance-behaviour congruity impacts memory and evaluations. Building upon prior work, we assessed influences of appearance-behaviour congruity on source memory and judgement strength to illustrate ways congruity effects permeate social cognition. We paired faces varying on trustworthiness with valenced behaviours to create congruent and incongruent face-behaviour pairs. Young and older adults remembered congruent pairs better than incongruent, but both were remembered better than pairs with faces rated average in appearance. This suggests that multiple, even conflicting, valenced cues improve memory over receiving fewer cues. Consistent with our manipulation of facial trustworthiness, congruity effects were present in the strength of trustworthiness-related but not dominance judgements. Subtle age differences emerged in congruity effects when learning about others, with older adults showing effects for approach judgements given both high and low arousal behaviours. Young adults had congruity effects for approach, prosociality and trustworthiness judgements, given high arousal behaviours only. These findings deepen our understanding of how appearance-behaviour congruity impacts memory for and evaluations of others.

Keywords: Trustworthiness; Impression formation; Source memory; Social judgements; Aging.

Impressions guide countless social decisions and have inspired decades of research. This research shows people tend to agree on both appearance-based (e.g., why I interpret faces as conveying different traits; Willis & Todorov, 2006; Zebrowitz & Montepare, 2008) and behaviour-based (e.g., why I think someone is smart because she earned an A; Todorov & Uleman, 2002, 2003) impressions, two distinct areas of work. The integration of appearance and behavioural cues is less studied, yet important because impression formation involves cue integration. Different cues are not always congruent, or consistent, meaning people's memories and actions could differ based on appearance-behaviour congruity.

Appearance-behaviour congruity is intriguing because people use both appearances (Todorov, 2008) and behaviours (McCarthy & Skowronski, 2011) to predict future behaviours and inform interactions. This appearance-behaviour interplay affects many aspects of our lives. A person's facial appearance (e.g., looking trustworthy or not), for instance, impacts the interpretation of ambiguous behavioural information (Hassin & Trope, 2000). As another example, people are more likely to agree with the positions of baby-faced over

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mature-faced individuals who have questionable trustworthiness after hearing their persuasive arguments, potentially because child-like faces convey honesty (Brownlow, 1992).

As previously studied (e.g., Nash, Bryer, & Schlaghecken, 2010), manipulating the valence conveyed by actor behaviours and faces varies appearance-behaviour congruity. People associate subjectively trustworthy facial characteristics with positive traits, and untrustworthy features with negative (Oosterhof & Todorov, 2008), with facial width being one cue associated with trustworthiness perceptions (Stirrat & Perrett, 2010). People also infer traits from behaviours (Uleman, Saribay, & Gonzalez, 2008), associating them with their actors (Todorov & Uleman, 2002). Many impression formation experiments (e.g., Cassidy & Gutchess, 2012) control for facial characteristics across conditions, potentially downplaying how appearance-behaviour congruity might influence interpreting and remembering others.

Recent work (Cassidy, Zebrowitz, & Gutchess, 2012; Kleider, Cavrak, & Knuycky, 2012; Nash et al., 2010; Rule, Slepian, & Ambady, 2012; Suzuki & Suga, 2010) explored appearance-behaviour congruity effects in memory. Creating congruent (e.g., trustworthy face/positive behaviour) and incongruent (e.g., trustworthy face/negative behaviour) face-behaviour pairs can lead to memory biases for both congruent (e.g., Nash et al., 2010) and incongruent (e.g., Suzuki & Suga, 2010) information. Conflicting findings correspond with outcome dependency hypothesis (Erber & Fiske, 1984; Stangor & McMillan, 1992); when perceiver outcomes are actor-dependent, incongruent information becomes privileged because perceivers want a better sense of prediction. Without actor-dependent outcomes, congruent information becomes privileged given motivation to maintain expectations. In memory, people might remember more incongruent person information in situations dependent on others (e.g., economic games). Without this dependency, people might better remember congruent information. Our studies explore congruity effects emerging from the latter.

Appearance-based inferences could function like schematic knowledge [i.e., associated information based on past experiences (Alba & Hasher, 1983)], contributing to congruity effects. Congruity effects may be akin to having better memory for schema-consistent sources when schemas act as decision cues (Bayen, Nakamura, Dupuis, & Yang, 2000). However, appearance-based information at test could cue *contextual* misattribution (e.g., this person performed a positive versus negative behaviour), opposed to remembering *what* was presented (e.g., I saw this person before; Johnson, Hashtroudi, & Lindsay, 1993). Thus, facial trustworthiness may be easier to use for decisions than remembering appearance-incongruent behaviours.

The present studies elaborated on prior work assessing congruity effects. First, we compared memory for congruent and incongruent appearance-behaviour information to behaviours performed by comparatively average-faced actors (i.e., rated as not discernably trustworthy or untrustworthy). This extends previous work by investigating whether having two enhanced diagnostic cues (i.e., both faces and behaviours) lead to better or worse memory for behaviours relative to receiving one cue (i.e., behaviour only). Although people glean information from average faces (Zebrowitz & Montepare, 2008), faces perceived positively structurally resemble happiness, while those perceived negatively resemble anger (Said, Sebe, & Todorov, 2009). Average faces may have comparatively less structural resemblance to emotional expressions, giving fewer cues to overgeneralise traits. How memories formed from multiple conflicting cues compare to those from fewer is unclear.

Although past work manipulating appearance-behaviour congruity has focused on memory (e.g., Nash et al., 2010), *when* effects emerge is unclear. Congruity effects could emerge when reconstructing information from memory. Effects could also manifest immediately after encountering congruent or incongruent information. Extant research supports the latter possibility (e.g., Hassin & Trope, 2000; Olivola & Todorov, 2010b). For instance, evaluating new faces as positive or negative depends on their similarity to ones previously paired with valenced information (Verosky & Todorov, 2010, 2013). Even when congruity does not impact actual ratings, it affects reaction time, with faster ratings towards congruent over incongruent face-trait pairs under time constraints (Rudoy & Paller, 2009). This suggests congruency impacts the ease of making person judgements. Although people may make similar overall

choices based on congruent and incongruent cues (i.e., the binary choice to approach or avoid), we predicted judgement *strength* would be tempered by incongruent cues. In addition, we investigated effects across several judgements and under varying levels of behavioural arousal. These manipulations provide insight into congruity's impact on social evaluation depending on context.

Further contributing to the literature, we examined these topics in both young and older adults. Young and older adults make similar overgeneralisations from faces (Boshyan, Zebrowitz, Franklin, McCormick, & Carre, 2013; Zebrowitz, Franklin, Hillman, & Boc, 2013) and react similarly to structural resemblance to emotions (Franklin & Zebrowitz, 2013). Whether appearance-behaviour congruity differentially impacts older adults is unknown. Beyond providing insight into the effect's generalisability across age groups, studying congruity effects with age is important given increased age-related fraud vulnerability (Ruffman, Murray, Halberstadt, & Vater, 2012). Age-related changes in interpreting deceptive person information may extend to considering potentially deceptive incongruent versus congruent appearance-behaviour cues.

Aging could increase sensitivity to congruity. While young adults rely on schemas when making decisions (Hicks & Cockman, 2003; Marsh, Cook, & Hicks, 2006), older adults may rely on schemas to a greater extent (Hess & Follett, 1994; Mather & Johnson, 2003; Shi, Tang, & Liu, 2012). Older adults also activate more stereotyped information than young to explain social situations (Radvansky, Lynchard, & von Hippel, 2009) and process incongruent behavioural information less (Hess & Tate, 1991). Given facial stereotypes, older adults may reflect on behaviours less than young, exacerbating congruity effects.

However, aging could also *decrease* sensitivity to congruity. Older adults emphasise trait-diagnostic information in judgements of others more than young (Hess & Auman, 2001) and have increased sensitivity to behavioural information that might moderate first impressions (Hess, Osowski, & Leclerc, 2005). This suggests greater social expertise with age (Hess, 2006). Attenuated congruity effects could emerge if older adults' inferences reflect behaviours better than young. We test these possibilities in the following studies.

EXPERIMENT 1

Although faces were *expressively* neutral in prior source memory work involving appearance-behaviour congruity (e.g., Cassidy et al., 2012), subjectively trustworthy or untrustworthy faces may provide more diagnostic information (Said et al., 2009) than faces falling between these categories.

Two possibilities emerged for how memory for congruent and incongruent pairs would compare to average-face pairs. First, while congruent face-behaviour pairs could be remembered over incongruent and average-face pairs, average-face pairs could be better remembered over incongruent because facial cues would not conflict with behaviours. Appearances might only be diagnostic to the extent that they do not conflict with behaviours. Second, congruent and incongruent pairs could be more accurately identified over average-face pairs if receiving enhanced diagnostic information from two sources versus one improves memory overall.

We also assessed age-related changes in the contribution of appearance-behaviour congruity to source memory. We expected exacerbated congruity effects among older adults versus young adults, given age differences in schema reliance.

METHOD

Participants

Twenty-eight older (65–95 years old, 15 females; $M = 76.86$, $SD = 7.84$) and 28 young adults (17–21 years old, 18 females; $M = 18.57$, $SD = 1.00$) recruited from Brandeis University and the surrounding community participated. The 17-year-old received parental permission to participate. Older adults had Mini-Mental State Examination (MMSE) scores >26 (Folstein, Folstein, & McHugh, 1975; $M = 29.04$, $SD = 1.00$). Young ($M = 12.46$, $SD = 0.88$) and older ($M = 15.93$, $SD = 2.60$) adults differed in years of education, $t(54) = 6.69$, $p < .001$. Older adults ($M = 35.54$, $SD = 3.29$) had higher vocabulary scores (Shipley, 1986) than young ($M = 33.07$, $SD = 2.98$), $t(54) = 2.94$, $p = .005$. Young adults had faster processing speed ($M = 80.2\ 9$, $SD = 10.99$) than older adults ($M = 59.11$, $SD = 8.93$), $t(54) = 7.91$, $p < .001$, as measured by digit-comparison

(Hedden et al., 2002), and higher letter-number sequencing scores (Wechsler, 1997; young adults: $M = 11.25$, $SD = 1.94$; older adults: $M = 9.79$, $SD = 2.35$; $t(54) = 2.55$, $p = .01$).

Stimuli

Faces and behaviours. Pilot data from young and older adults were used to assign 48 male faces (24 young adults/24 older adults) drawn from the PAL database (Minear & Park, 2004) and 48 behaviours (24 positive/24 negative) drawn from a larger data set (Somerville, Wig, Whalen, & Kelley, 2006) to conditions. Faces of each age group were evenly categorised as trustworthy, average and untrustworthy. The trustworthy and untrustworthy faces did not differ from average faces in distinctiveness. Analyses confirmed differences between the face categories and the valenced behaviours and matched for other features (behavioural arousal and valence extremity). See supplemental materials for full details.

Face-behaviour pairs. The 16 trustworthy, 16 average and 16 untrustworthy faces were paired evenly with positive and negative behaviours (equally split among young and older faces in each trustworthiness category). Trustworthy face/positive behaviour pairs and untrustworthy face/negative behaviour pairs were categorised as "congruent". Trustworthy face/negative behaviour pairs and untrustworthy face/positive behaviour pairs were categorised as "incongruent". Average-face/positive behaviour pairs and average-face/negative behaviour pairs were categorised as "average-face" pairs. Two task versions counterbalanced the pairs. Faces paired with positive behaviours in one version were paired with negative in the other. Note that 16 face-behaviour pairs per condition are consistent with prior related work (Nash et al., 2010) and meet the recommendation for the minimum number of stimuli per condition in counterbalanced designs (Westfall, Kenny, & Judd, 2014).

Procedure

Encoding. Unaware of a memory task, participants were told they were participating in a task assessing reaction times and social cognition. Stimuli were presented via E-Prime (Psychology Software Tools, Pittsburgh, PA). Participants viewed each face alone for two seconds. Participants pressed "1" after viewing the face. Then, they saw the same face paired with a behaviour for five seconds. Participants pressed "2" after reading the sentence (Figure 1A). Participants were told their responses would not advance stimuli, but that they should respond quickly. Responses ensured attention to stimuli.

There were four blocks of 12 trials each in each run, with same-age faces in each block and six seconds between each block. Block order was counterbalanced among the task versions (i.e., half of participants saw older faces in the first block). To improve performance, pairs appeared twice, once per run in a random order. After encoding, participants completed the digit-comparison measure (Hedden et al., 2002).

Retrieval. Participants completed a self-paced task. Participants viewed all faces from encoding, with no new faces, one at a time in a random order. Participants were told they would view faces from the previous task, with no new ones. The words "Positive" and "Negative" appeared below each face. Participants indicated their behaviour-based impressions as positive or negative (Figure 1B). Memory was scored based on prior behaviour categorisations as positive or negative, similar to other work (Cassidy et al., 2012; Nash et al., 2010).

Unbiased hit rate

We used unbiased hit rates proposed by Wagner (1993) and previously employed in assessing appearance-behaviour congruity influences on memory (Suzuki & Suga, 2010) to control for response biases (e.g., a tendency to respond "positive" for trustworthy faces). We calculated unbiased hit rates by multiplying hit rates by response bias terms. For example, the hit rate for congruent pairs would be the proportion of the number of faces (collapsing across trustworthy and untrustworthy) previously associated with congruent behaviours (collapsing across positive and negative) that were correctly classified to the total number of congruent pairs in the study. The response bias term would be the proportion

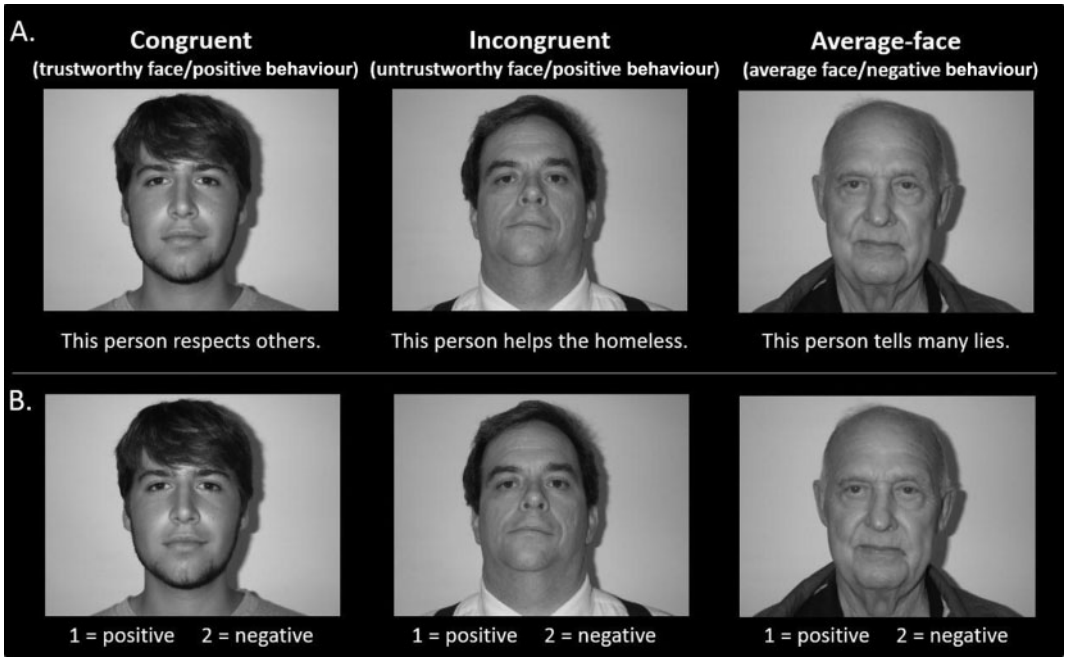

Figure 1. Example congruent, incongruent and average-face pairs. The terms "congruent", "incongruent" and "average-face" were not viewed (A). Example retrieval stimuli (B).
Source: Minear and Park (2004).

of the number of congruent pairs correctly classified to the total number of faces classified congruently with appearance. We calculated unbiased hit rates for congruent, incongruent and average-face pairs.

RESULTS

Memory

We analysed memory in a 2 (age group: young, old) × 3 (congruity: congruent, incongruent, average-face) mixed analysis of variance (ANOVA). All participants performed above chance. A congruity effect existed, $F(2, 108) = 8.57$, $p < .001$, $\eta_p^2 = 0.14$. Congruent pairs ($M = 0.54$, $SD = 0.15$) were better remembered than incongruent ($M = 0.51$, $SD = 0.17$), $F(1, 54) = 4.58$, $p = .04$, $\eta_p^2 = 0.08$, and average-face pairs ($M = 0.46$, $SD = 0.18$), $F(1, 54) = 13.82$, $p < .001$, $\eta_p^2 = 0.20$. Incongruent pairs were remembered better than average-face ones, $F(1, 54) = 5.21$, $p = .03$, $\eta_p^2 = 0.09$. Contrary to prediction, no age group × congruity interaction emerged, $F(2, 108) = 0.03$, $p = .97$, $\eta_p^2 = 0.01$. No main effect of Age Group existed, $F(1, 54) = 0.08$, $p = .78$, $\eta_p^2 = 0.01$. See Table 1 for full descriptive statistics for each age group. Note that power analyses conducted in G*Power (Mayr, Erdfelder, Buchner, & Faul, 2007) for sample size estimation suggested a total sample of 34 to detect effects using alpha = 0.05, power = 0.80, and Cohen's $f = 0.23$ ($\eta_p^2 = 0.05$).

Exploring the contributions of behavioural valence and facial trustworthiness to memory

Our primary purpose was to examine effects appearance-behaviour congruity on source memory and related effects of aging. Other work illustrates age-related changes in processing of valenced material. Our primary analysis would not capture this possibility. While young may focus on incoming negative cues, older adults may attend to more positive information (Mather & Carstensen, 2005; Spaniol, Voss, & Grady, 2008). We tested this idea in a 2 (age group:

TABLE 1
Young (YA) and older (OA) adults' unbiased hit rates [*M* (*SD*)] for congruent, incongruent and average-face pairs

	Congruent	*Incongruent*	*Average-face*
YA	0.54 (0.15)	0.52 (0.15)	0.47 (0.17)
OA	0.54 (0.16)	0.50 (0.19)	0.45 (0.19)

young, old) × 3 (facial trustworthiness: trustworthy, untrustworthy, average) × 2 (behavioural valence: positive, negative) mixed ANOVA.

Facial trustworthiness impacted memory, $F(2, 108) = 5.95$, $p = .004$, $\eta_p^2 = 0.10$. Behaviours of average faces ($M = 0.46$, $SD = 0.10$) were remembered less well than those of trustworthy ($M = 0.52$, $SD = 0.10$), $F(1, 54) = 5.57$, $p = .02$, $\eta_p^2 = 0.09$, and untrustworthy faces ($M = 0.55$, $SD = 0.46$), $F(1, 54) = 10.56$, $p = .002$, $\eta_p^2 = 0.16$. Memory of trustworthy and untrustworthy faces' behaviours did not differ, $F(1, 54) = 1.64$, $p = .21$, $\eta_p^2 = 0.03$.

A marginal interaction existed between facial trustworthiness and behavioural valence, $F(2, 108) = 3.07$, $p = .05$, $\eta_p^2 = 0.05$. People remembered more positive ($M = 0.54$, $SD = 0.07$) than negative ($M = 0.50$, $SD = 0.08$) behaviours from trustworthy faces, $F(1, 54) = 5.92$, $p = .02$, $\eta_p^2 = 0.10$. Memory did not differ between valenced behaviours of untrustworthy [positive: $M = 0.55$, $SD = 0.08$; negative: $M = 0.56$, $SD = 0.08$; $F(1, 54) = 0.78$, $p = .38$, $\eta_p^2 = 0.01$] or average [positive: $M = 0.47$, $SD = 0.07$; negative: $M = 0.45$, $SD = 0.07$; $F(1, 54) = 1.55$, $p = .22$, $\eta_p^2 = 0.03$] faces. No other effects were significant, $ps > .12$.

DISCUSSION

Congruent pairs were remembered over incongruent and average-face pairs, evidencing a congruity effect in memory and extending prior work. This demonstrates the extent of memory enhancements or impairments given appearance-behaviour congruity. Even when inconsistent, receiving multiple streams of enhanced valenced information improves memory over receiving fewer. If both faces and behaviours convey clearly valenced diagnostic information, they may be better attended to, and leading to, richer person representations and more accurate source memory decisions.

Interestingly, our findings may connect to more general memory work on dual coding, in which two different streams of descriptive information (e.g., verbal and visual) lead to enhanced memory over fewer streams (for a review, see Paivio, 1991). Previous work has also found better facial recognition with increased task emotionality (Mueller, Heesacker, Ross, & Nicodemus, 1983). Our task may be similar in that the social value of stimuli could be increased based on the diagnostic value of appearance- and behaviour-derived traits. Alternatively, our findings may reflect a dilution effect (Nisbett, Zukier, & Lemley, 1981). Comparably, less trait-diagnostic information from appearances (i.e., appearing average compared to more extremely trustworthy or untrustworthy) could have weakened the predictive value of valenced behaviours, reducing memory compared to when both faces and behaviours conveyed richer trait-diagnostic information. Average faces might also contain more ambiguous cues than overtly trustworthy or untrustworthy ones, weakening their diagnostic value and reducing memory. Future work could test these possibilities.

Contrary to our prediction, age-invariant memory performance suggests older adults remember incongruent appearance-behaviour information like young. This is consistent with work showing young and older adults similarly remember socio-emotional information (Cassidy & Gutchess, 2012; May, Rahhal, Berry, & Leighton, 2005; Rahhal, May, & Hasher, 2002; Todorov & Olson, 2008), in contrast to age-related declines in non-social memory tasks (review by Grady & Craik, 2000). However, it is also possible that the self-paced retrieval task may have allowed time for older adults to resolve incongruity. A constrained task could elicit age differences, as increasing cognitive load reduces the ability to resolve incongruent information (Macrae, Bodenhausen, Schloerscheidt, & Milne, 1999).

Finally, remembering congruent over incongruent *trustworthy* face-behaviour pairs drove the present congruity effect. Untrustworthy faces are prioritised in memory, potentially reflecting an evolved "cheater detection system" (Mealey, Daood, & Krage, 1996). Indeed, people have better memory for untrustworthy over trustworthy faces (Mueller, Thompson, & Vogel, 1988), regardless of whether the faces are encoded with behaviours (Rule et al., 2012). Negative facial cues could warrant the allocation of attention to associated behaviours, increasing memory. When encountering positive facial cues, schema-consistent expectations might lead to the prioritisation of positive behaviours over negative. Additionally, these findings complement recent work showing that both trustworthy and untrustworthy faces are better remembered than trustworthy neutral ones (Mattarozzi, Todorov, & Codispoti, 2014).

EXPERIMENT 2

Like prior work, Experiment 1 assessed contributions of appearance-behaviour congruity to memory. Other work (e.g., Hassin & Trope, 2000) suggests appearance-behaviour congruity effects are not solely memory phenomena; thus, we investigated whether congruity impacts judgement strength immediately after learning about others, without relying on memory. We predicted judgements to be stronger towards congruent over incongruent face-behaviour pairs, due to the convergence of multiple streams of information. This prediction could impact important social outcomes. For instance, the strength of initial reactions could impact whether someone receives a second job interview.

Like Experiment 1, we expected age-related exacerbation of congruity effects given increased schema reliance with age. However, given other work on aging and impression formation (Hess et al., 2005), these effects could be attenuated with age, should older adults be particularly sensitive to incoming behavioural information.

As a secondary goal, we examined two factors potentially modulating how congruity impacts judgement strength. First, we tested how effects might be constrained by the *type* of judgement at hand. To test this, we assessed the presence of effects for trustworthiness-related judgements for social interactions involving direct interaction (i.e., approach behaviour), indirect interactions (i.e., prosociality behaviour, in which one donates to an individual but does not have to meet that person) and personality judgements (i.e., perceived trustworthiness). We used a dominance judgement as a control. Trustworthiness and dominance fall on separable dimensions of face evaluation (Oosterhof & Todorov, 2008). Because we manipulated facial trustworthiness and not dominance, we predicted congruity effects would hold for the three trustworthiness-related judgements but not the dominance judgement.

Second, we assessed how *behavioural arousal* impacts congruity effects. Arousal influences social cognition. For instance, events eliciting heightened arousal (i.e., an increased emotional response) are often better remembered (Cahill & McGaugh, 1998) and arousal influences subsequent judgements (Peters, Västfjall, Gärling, & Slovic, 2006). Given arousing behaviours, we predicted similar judgements for congruent and incongruent face-behaviour pairs, reflecting behavioural emphasis. Given low arousal behaviours (i.e., eliciting little emotional response), we predicted stronger judgements towards congruent over incongruent pairs. Here, appearances might be more likely to distort judgements.

METHOD

Participants

Thirty-two older (63–93 years old, 23 females; $M = 75.38$, $SD = 7.94$) and 32 young adults (18–22 years old, 20 females; $M = 18.38$, $SD = 0.91$) recruited from Brandeis University and the surrounding community participated. Older adults had MMSE scores >26 (Folstein et al., 1975; $M = 29.22$, $SD = 1.01$). Older adults ($M = 16.67$, $SD = 2.22$) had more years of education than young ($M = 13.08$, $SD = 1.17$), $t(62) = 8.13$, $p < .001$. Older adults ($M = 36.13$, $SD = 4.35$) had higher vocabulary scores (Shipley, 1986) than young ($M = 30.47$, $SD = 4.09$), $t(62) = 5.36$, $p < .001$. Young had faster processing speed ($M = 81.47$, $SD = 14.67$) than older adults ($M = 60.69$, $SD = 11.91$), $t(62) = 6.22$, $p < .001$, (Hedden et al., 2002) and higher letter-number sequencing scores (Wechsler, 1997; young: $M = 11.97$, $SD = 2.38$; older adults: $M = 9.72$, $SD = 2.80$; $t(62) = 3.47$, $p = .001$).

Stimuli

Faces and behaviours. Pilot data from young and older adults were used to assign 80 young male faces (evenly split by trustworthy/untrustworthy) generated via FaceGen version 3.1 using a model developed by Oosterhof and Todorov (2008) and 80 behaviours (evenly split by positive/negative valence and high/low arousal) from previous aging work (Cassidy & Gutchess, 2012) to conditions. Analyses confirmed differences between the trustworthy and untrustworthy faces and the positive and negative behaviours varying on arousal. Analyses also assessed differences in stimuli on other relevant features (perceived face age, perceived face valence, behavioural valence and behavioural valence extremity), with no differences impacting the present study. See supplemental materials for full details.

Face-behaviour pairs. The 40 trustworthy and 40 untrustworthy faces were evenly paired with

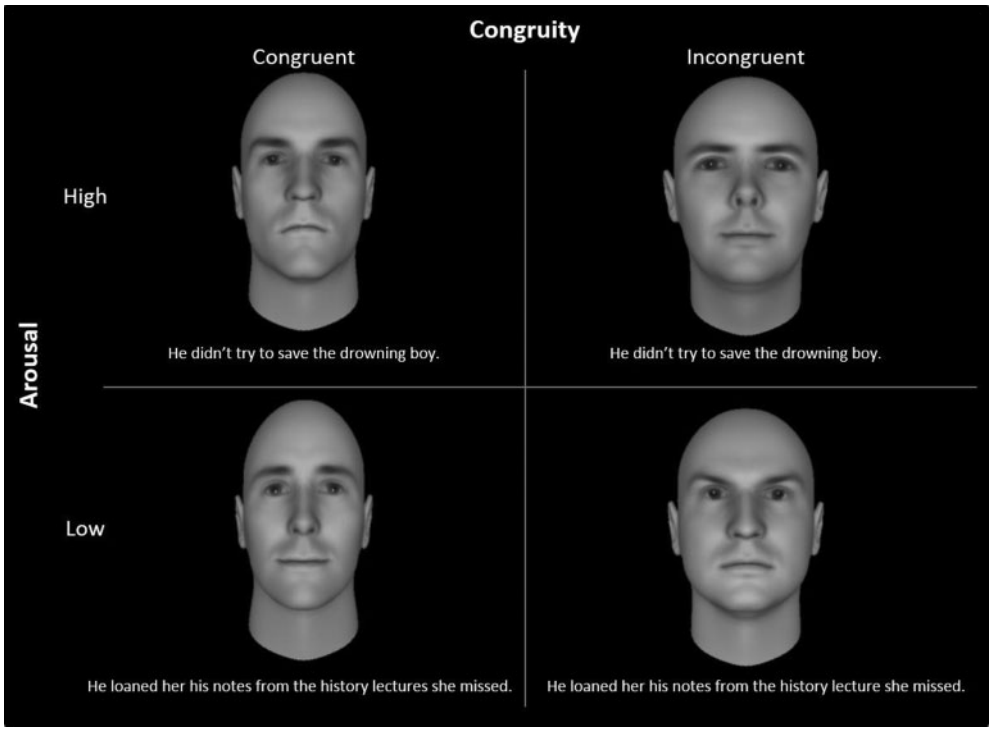

Figure 2. Example congruent and incongruent face-behaviour pairs performing high and low arousal behaviours. Source: Oosterhof and Todorov (2008).

congruent (trustworthy-positive and untrustworthy-negative) or incongruent (trustworthy-negative or untrustworthy-positive) high and low arousal behaviours. Faces were paired with high or low arousal congruent or incongruent behaviours across four task versions.

Procedure

Participants were told this was a self-paced task about how people get to know others. Stimuli were presented via E-Prime (Psychology Software Tools, Pittsburgh, PA). Participants viewed each face alone for two seconds. Then, participants saw the same face paired with a behaviour for five seconds (Figure 2). After the five-second interval, participants made four self-paced judgements: approach ("Would I approach this person?"), prosociality ("If in need, how much would I donate to this person?"), trustworthiness ("How trustworthy is this person?") and dominance ("How dominant is this person?"). Responses were entered via 9-point scales. Question order varied by version (i.e., each question was asked first, second, third or fourth). There were eight blocks of 10 trials each, with six seconds between each block.

Judgement strength

To compare judgements made about different types of congruent and incongruent pairs (e.g., collapsing across trustworthy face/positive behaviour and untrustworthy face/negative behaviour), we calculated judgement strength separately for the four judgements. Specific responses were subtracted from the mean of each participant's responses for each judgement type. To compare judgement strength, we took the absolute values of these subtractions. This accounts for individual differences in scale use and is similar to calculations from aging work on trait attribution (Follett & Hess, 2002).

RESULTS

We analysed judgement strength in a 2 (age group: young, old) × 4 (judgement: approach,

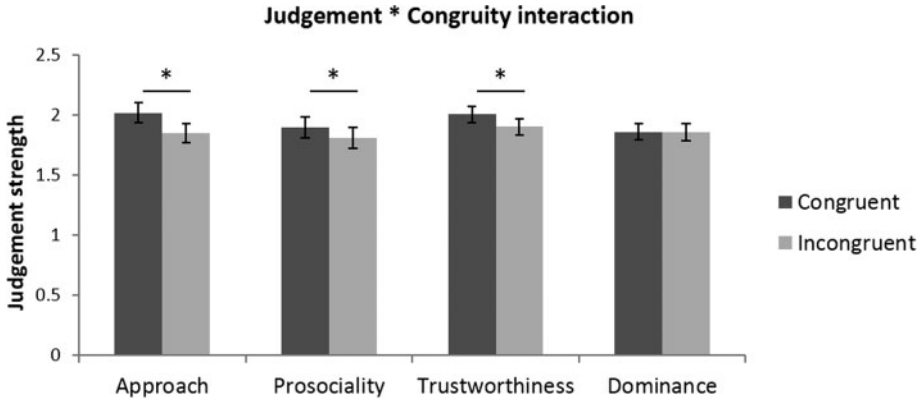

Figure 3. Congruity effects for trustworthiness-related but not dominance-related judgements. Error bars represent standard error. *$p < .05$.

prosociality, trustworthiness, dominance) × 2 (congruity: congruent, incongruent) × 2 (behavioural arousal: high, low) mixed ANOVA. For brevity, findings unrelated to congruity have been relegated to footnote.[1] Note that power analyses conducted in G*Power suggested a total sample size of 40 to detect effects using alpha = 0.05, power = 0.80, and Cohen's $f = 0.23$ ($\eta_p^2 = 0.05$).

Influence of congruity on judgement strength

Judgements were stronger towards congruent ($M = 1.95$, $SD = 0.53$) over incongruent ($M = 1.85$, $SD = 0.50$) pairs, $F(1, 62) = 13.79$, $p < .001$, $\eta_p^2 = 0.18$. The anticipated interaction between judgement and congruity emerged, $F(3, 186) = 4.67$, $p = .004$, $\eta_p^2 = 0.07$ (Figure 3). Congruent pairs elicited stronger judgements than incongruent for approach (congruent: $M = 2.02$, $SD = 0.66$; incongruent: $M = 1.85$, $SD = 0.62$; $F(1, 62) = 16.87$, $p < .001$, $\eta_p^2 = 0.21$), prosociality (congruent: $M = 1.90$, $SD = 0.68$; incongruent: $M = 1.81$, $SD = 0.67$; $F(1, 62) = 5.15$, $p = .03$, $\eta_p^2 = 0.08$) and trustworthiness (congruent: $M = 2.01$, $SD = 0.55$; incongruent: $M = 1.90$, $SD = 0.53$; $F(1, 62) = 10.30$, $p = .002$, $\eta_p^2 = 0.14$) judgements. Dominance judgements were unaffected by congruency (congruent: $M = 1.86$, $SD = 0.56$; incongruent: $M = 1.86$, $SD = 0.55$; $F(1, 62) = 0.01$, $p = .92$, $\eta_p^2 = 0.01$).

Influence of congruity qualified by behavioural arousal

Behavioural arousal qualified the relationship between judgement and congruity, $F(3, 186) = 3.19$, $p = 0.03$, $\eta_p^2 = 0.05$. We report findings for each judgement.

Approach. Judgements towards high arousal-congruent pairs ($M = 2.31$, $SD = 0.73$) were stronger than for incongruent pairs ($M = 2.08$, $SD = 0.72$), $F(1, 62) = 15.61$, $p < .001$, $\eta_p^2 = 0.20$.

[1] Judgements were stronger given high ($M = 2.14$, $SD = 0.54$) versus low arousal ($M = 1.66$, $SD = 0.50$), $F(1, 62) = 214.83$, $p < .001$, $\eta_p^2 = 0.78$, and qualified by Judgement, $F(3, 186) = 25.86$, $p < .001$, $\eta_p^2 = 0.29$. Given high arousal, dominance judgements ($M = 1.98$, $SD = 0.57$) were weaker than both approach [$M = 2.20$, $SD = 0.69$; $F(1, 62) = 11.70$, $p = .001$, $\eta_p^2 = 0.16$] and trustworthiness [$M = 2.26$, $SD = 0.58$; $F(1, 62) = 19.76$, $p < .001$, $\eta_p^2 = 0.24$] judgements. Trustworthiness judgements were marginally stronger than prosociality ($M = 2.12$, $SD = 0.72$) judgements, $F(1, 62) = 2.95$, $p = .09$, $\eta_p^2 = 0.05$. There was no difference between dominance and prosociality judgements [$F(1, 62) = 2.80$, $p = .10$, $\eta_p^2 = 0.04$] and between approach and trustworthiness [$F(1, 62) = 1.11$, $p = .30$, $\eta_p^2 = 0.02$] or prosociality [$F(1, 62) = 1.38$, $p = .25$, $\eta_p^2 = 0.02$] judgements. Given low arousal, participants made stronger dominance ($M = 1.74$, $SD = 0.54$) than prosociality [$M = 1.59$, $SD = 0.64$; $F(1, 62) = 4.35$, $p = .04$, $\eta_p^2 = 0.07$] judgements. Participants made marginally stronger dominance than trustworthiness judgements ($M = 1.65$, $SD = 0.53$), $F(1, 62) = 2.88$, $p = .095$, $\eta_p^2 = 0.04$. There was no difference between dominance and approach ($M = 1.66$, $SD = 0.60$) judgements, $F(1, 62) = 1.69$, $p = .20$, $\eta_p^2 = 0.03$. There were no differences between trustworthiness judgements and approach [$F(1, 62) = 0.12$, $p = .73$, $\eta_p^2 < 0.01$] and prosociality [$F(1, 62) = 0.93$, $p = .34$, $\eta_p^2 = 0.02$] judgements and between approach and prosociality judgements [$F(1, 62) = 1.36$, $p = .25$, $\eta_p^2 = 0.02$]. No other findings in the experiment were significant, $ps > .14$.

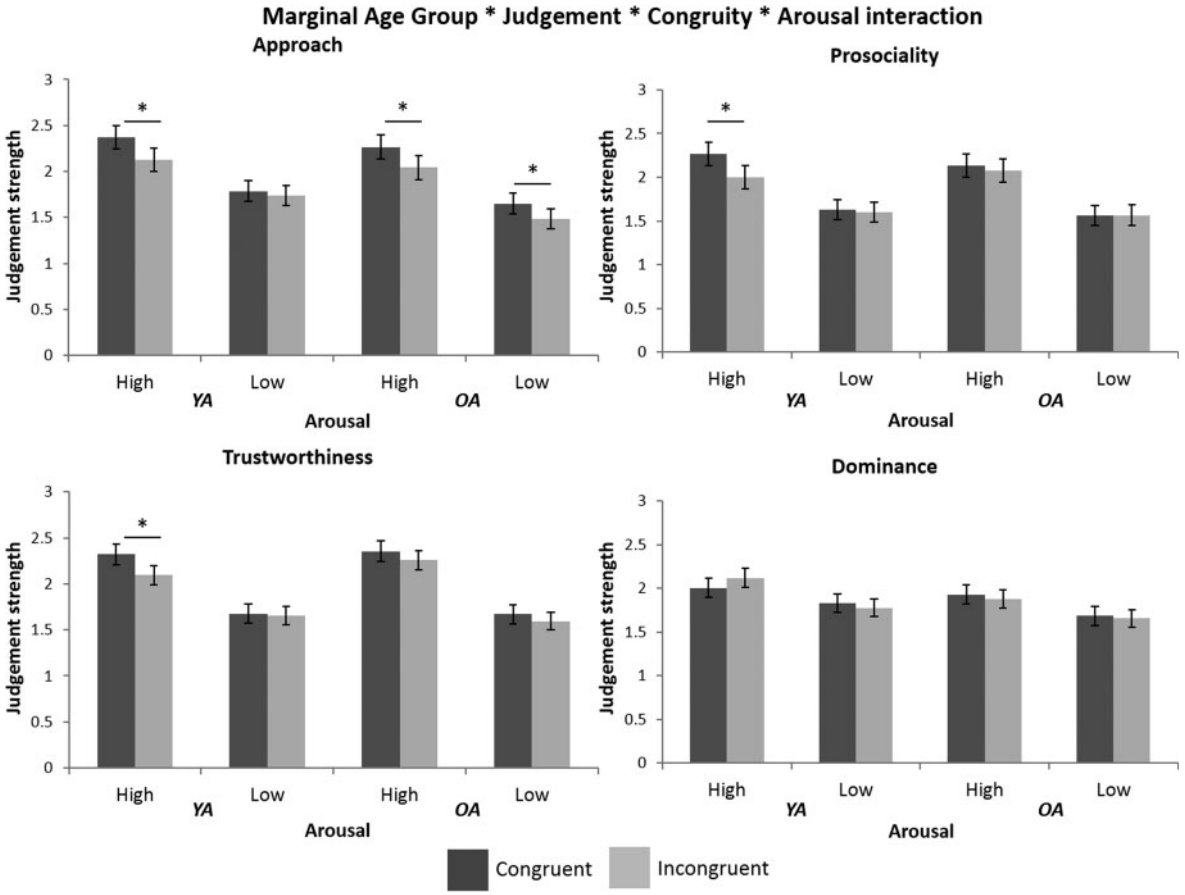

Figure 4. Congruity effects in young adults' (YA) approach, prosociality and trustworthiness judgements when pairs involved high arousal behaviours. Congruity effects in older adults' (OA) approach judgements. Error bars represent standard error. *$p < .05$.

This also occurred among low arousal pairs ($M_{congruent}$ = 1.71, $SD_{congruent}$ = 0.63; $M_{incongruent}$ = 1.61, $SD_{incongruent}$ = 0.62), $F(1, 62) = 5.31$, $p = .03$, $\eta_p^2 = 0.08$.

Prosociality. Judgements towards high arousal-congruent pairs (M = 2.20, SD = 0.76) were stronger than incongruent pairs (M = 2.04, SD = 0.75), $F(1, 62) = 8.21$, $p = .01$, $\eta_p^2 = 0.12$. Low arousal congruent (M = 1.60, SD = 0.66) and incongruent (M = 1.58, SD = 0.66) pairs did not differ, $F(1, 62) = 0.14$, $p = .71$, $\eta_p^2 = 0.01$.

Trustworthiness. Judgements towards high arousal-congruent pairs (M = 2.34, SD = 0.63) were stronger than incongruent pairs (M = 2.04, SD = 0.58), $F(1, 62) = 9.98$, $p = .002$, $\eta_p^2 = 0.14$. Low arousal-congruent (M = 1.67, SD = 0.58) and incongruent (M = 1.63, SD = 0.55) pairs did not differ, $F(1, 62) = 0.90$, $p = .35$, $\eta_p^2 = 0.01$.

Dominance. High arousal-congruent (M = 1.97, SD = 0.62) and incongruent (M = 2.00, SD = 0.61) pairs did not differ, $F(1, 62) = 0.37$, $p = .55$, $\eta_p^2 = 0.01$. Low arousal-congruent (M = 1.76, SD = 0.60) and incongruent (M = 1.72, SD = 0.57) pairs did not differ, $F(1, 62) = 0.56$, $p = .46$, $\eta_p^2 = 0.01$.

Age differences in the influence of congruity on judgement strength

The predicted age group × congruity interaction was not significant, $F(1, 62) = 0.04$, $p = 0.85$, $\eta_p^2 = 0.01$. However, there was a marginal interaction between age group, congruity, judgement and arousal, $F(3, 186) = 2.57$, $p = .06$, $\eta_p^2 = 0.04$ (Figure 4). We consider findings for each judgement.

Approach. Both young ($M_{congruent}$ = 2.37, $SD_{congruent}$ = 0.68; $M_{incongruent}$ = 2.13, $SD_{incongruent}$ = 0.68)

and older ($M_{congruent}$ = 2.27, $SD_{congruent}$ = 0.79; $M_{incongruent}$ = 2.04, $SD_{incongruent}$ = 0.76) adults had stronger judgements for high arousal-congruent over incongruent face-behaviour pairs [young: $F(1, 31) = 7.57$, $p = 0.01$, $\eta_p^2 = 0.20$; old: $F(1, 31) = 8.12$, $p = 0.01$, $\eta_p^2 = 0.21$]. Older adults had stronger judgements for low arousal-congruent ($M = 1.65$, $SD = 0.64$) over incongruent ($M = 1.48$, $SD = 0.59$) pairs, $F(1, 31) = 7.88$, $p = .01$, $\eta_p^2 = 0.20$. There was no difference between low arousal-congruent ($M = 1.79$, $SD = 0.62$) and incongruent ($M = 1.74$, $SD = 0.62$) among young, $F(1, 31) = 0.43$, $p = .52$, $\eta_p^2 = 0.01$.

Prosociality. Young adults had stronger judgements towards high arousal-congruent ($M = 2.26$, $SD = 0.77$) over incongruent ($M = 2.00$, $SD = 0.66$) pairs, $F(1, 31) = 10.91$, $p = .002$, $\eta_p^2 = 0.26$. In older adults, high arousal-congruent ($M = 2.13$, $SD = 0.75$) and incongruent ($M = 2.08$, $SD = 0.62$) did not differ, $F(1, 31) = 0.51$, $p = .48$, $\eta_p^2 = 0.02$. Low arousal-congruent and incongruent behaviours did not differ for young [$M_{congruent}$ = 1.60, $SD_{congruent}$ = 0.65; $M_{incongruent}$ = 1.59, $SD_{incongruent}$ = 0.66; $F(1, 31) = 0.22$, $p = .64$, $\eta_p^2 = 0.01$] or older adults [$M_{congruent}$ = 1.57, $SD_{congruent}$ = 0.57; $M_{incongruent}$ = 1.56, $SD_{incongruent}$ = 0.66; $F(1, 31) < 0.01$, $p = .99$, $\eta_p^2 = 0.01$].

Trustworthiness. Young adults had stronger judgements towards high arousal-congruent ($M = 2.32$, $SD = 0.56$) over incongruent ($M = 2.10$, $SD = 0.55$) pairs, $F(1, 31) = 9.72$, $p = .01$, $\eta_p^2 = 0.24$. In older adults, high arousal-congruent ($M = 2.35$, $SD = 0.76$) and incongruent ($M = 2.36$, $SD = 0.63$) did not differ, $F(1, 31) = 1.76$, $p = .19$, $\eta_p^2 = 0.05$. Low arousal-congruent and incongruent behaviours did not differ for young [$M_{congruent}$ = 1.68, $SD_{congruent}$ = 0.57; $M_{incongruent}$ = 1.66, $SD_{incongruent}$ = 0.55; $F(1, 31) = 0.06$, $p = .81$, $\eta_p^2 = 0.01$] or older adults [$M_{congruent}$ = 1.67, $SD_{congruent}$ = 0.57; $M_{incongruent}$ = 1.60, $SD_{incongruent}$ = 0.55; $F(1, 31) = 2.09$, $p = .16$, $\eta_p^2 = 0.06$].

Dominance. Judgements of high arousal-congruent and incongruent pairs did not differ for young [$M_{congruent}$ = 2.00, $SD_{congruent}$ = 0.61; $M_{incongruent}$ = 2.11, $SD_{incongruent}$ = 0.61; $F(1, 31) = 1.83$, $p = .19$, $\eta_p^2 = 0.06$] or older adults [$M_{congruent}$ = 1.93, $SD_{congruent}$ = 0.62; $M_{incongruent}$ = 1.88, $SD_{incongruent}$ = 0.61; $F(1, 31) = 0.50$, $p = .49$, $\eta_p^2 = 0.02$]. Low arousal-congruent and incongruent did not differ for young [$M_{congruent}$ = 1.83, $SD_{congruent}$ = 0.60; $M_{incongruent}$ = 1.78, $SD_{incongruent}$ = 0.57; $F(1, 31) = 0.45$, $p = .51$, $\eta_p^2 = 0.01$] or older adults [$M_{congruent}$ = 1.68, $SD_{congruent}$ = 0.60; $M_{incongruent}$ = 1.66, $SD_{incongruent}$ = 0.57; $F(1, 31) = 0.14$, $p = .72$, $\eta_p^2 = 0.01$].

Exploring the contributions of behavioural valence and facial trustworthiness to judgement strength

Like Experiment 1, we assessed potential contributions of behavioural valence and facial trustworthiness to judgement strength. Negative information may be more salient than positive (Rozin & Royzman, 2001). If negativity biases attenuate with age (e.g., Wood & Kisley, 2006), older adults' judgements may be similar regardless of behavioural valence. We tested this in a 2 (age group: young, old) × 2 (facial trustworthiness: trustworthy, untrustworthy) × 2 (behavioural valence: positive, negative) mixed ANOVA.

There were stronger judgements for trustworthy ($M = 1.94$, $SD = 0.52$) versus untrustworthy ($M = 1.86$, $SD = 0.54$) faces, $F(1, 62) = 4.54$, $p = .04$, $\eta_p^2 = 0.07$. Participants made stronger judgements given negative ($M = 1.81$, $SD = 0.52$) versus positive ($M = 1.99$, $SD = 0.51$) behaviours, $F(1, 62) = 44.98$, $p < .001$, $\eta_p^2 = 0.42$.

An interaction between facial trustworthiness and behavioural valence emerged, $F(1, 62) = 12.40$, $p = .001$, $\eta_p^2 = 0.17$. Congruent positive pairs ($M = 1.90$, $SD = 0.57$) elicited stronger judgements than pairs with positive behaviours but untrustworthy faces ($M = 1.73$, $SD = 0.56$), $F(1, 62) = 9.80$, $p = .003$, $\eta_p^2 = 0.44$. Congruent negative pairs ($M = 1.99$, $SD = 0.55$) and pairs with negative behaviours but trustworthy faces ($M = 1.98$, $SD = 0.51$) did not differ, $F(1, 62) = 0.08$, $p = .78$, $\eta_p^2 = 0.01$.

An age group by behavioural valence interaction existed, $F(1, 62) = 4.63$, $p = .04$, $\eta_p^2 = 0.07$. Young adults had stronger judgements given negative ($M = 2.05$, $SD = 0.51$) versus positive ($M = 1.82$, $SD = 0.53$) behaviours, $F(1, 31) = 57.35$, $p < .001$, $\eta_p^2 = 0.65$. Older adults also showed this pattern (negative: $M = 1.92$, $SD = 0.51$; positive: $M = 1.80$, $SD = 0.53$), $F(1, 31) = 7.88$, $p = .01$, $\eta_p^2 = 0.20$. A larger effect size for young versus older adults means behavioural valence accounts for less variance in judgement strength with age. This suggests age-related attenuation in making stronger judgements when behaviours are negative versus positive. No other effects were significant, $ps > .55$.

DISCUSSION

Judgements were stronger for congruent over incongruent face-behaviour pairs, extending prior work by demonstrating congruity effects immediately after learning about others. This may inform findings of appearance-congruent behavioural outcomes. For instance, looking competent improves the odds of winning elections (Olivola & Todorov, 2010a). Performing appearance-congruent behaviours may magnify this effect.

Congruity impacted the strength of three trustworthiness-related judgements but not dominance judgements. This suggests congruity impacts passing personality judgements ("How trustworthy is this person?") as well as judgements potentially evoking deeper processing given potential social interaction ("Would I approach this person?"). Congruity may matter most when decisions directly relate to facial features. Thus, trustworthiness may contribute to judgement strength most when decisions involve trustworthiness and valence. Future work could test this idea by comparing trustworthiness and competence judgement strength towards valenced face-behaviour pairs. Competence may be distinct from trustworthiness/warmth (Fiske, Cuddy, & Glick, 2007) yet is more rigidly valenced than dominance because dominant *and* passive behaviours vary in valence. If congruity effects depend on manipulated facial features, manipulating trustworthiness should not result in effects on competence judgements.

Behavioural arousal qualified the relationship between congruity and judgement type differently than anticipated. We expected effects for pairs including low- versus high arousal behaviours. Instead, we found effects in the three trustworthiness-related judgements for pairs with *high*, not low, arousal behaviours. An effect also existed among approach judgements given low-arousal behaviours. This suggests high arousal appearance-congruent behaviours *enhance* judgement strength relative to incongruent ones. Learning appearance-congruent behaviours could enhance impressions, similar to how people tend to accept information confirming their opinions (Lord, Ross, & Lepper, 1979).

Fewer differences for low arousal behaviours may reflect less diagnostic aspects of low arousal information (Skowronski & Carlston, 1987). Alternatively, attention to relevant facial characteristics might also be enhanced by congruent high arousal behaviours, resulting in stronger judgements. Previous work is consistent with this idea. For instance, people have stronger evaluations towards those who look similar to people paired with valenced information (Verosky & Todorov, 2010, 2013).

Age-related influences on congruity effects differed from expectations. While both age groups had stronger approach judgements for high arousal-congruent over incongruent pairs, older adults had the same relationship for low arousal pairs. In contrast, young, but not older, adults had stronger prosociality and trustworthiness judgements for high arousal-congruent versus incongruent pairs. This suggests that for the above-described relationship between judgement, congruity and behavioural arousal, older adults drove effects for approach judgements, and young adults drove effects elicited by prosociality and trustworthiness judgements.

A stronger effect for older adults in approach judgements complements work showing that despite fewer reported friendships (Chown, 1981), emotional closeness increases with age (Carstensen, 1992). If social partner selectivity increases with age, congruity effects in approach decisions could optimise the likelihood of successful interactions. Although unpredicted, appearance-behaviour congruity may become more important for considering social interactions with age, and less important for decisions not involving the self. Future work could test this by manipulating the extent of personal implications from different judgements.

The presence of negative behaviours attenuated congruity effects. Negative information captures more attention than positive (Pratto & John, 1991; Skowronski & Carlston, 1989). Negative behaviours are also more diagnostic in the morality domain, with positive behaviours more diagnostic in the ability domain (Skowronski & Carlston, 1987). It would be worthwhile to assess whether effects weaken in the presence of negative morality-related *and* positive ability-related behaviours. This relationship also differs from the exploratory findings of Experiment 1. There, a congruity effect emerged given trustworthy faces, with similar memory for behaviours of untrustworthy faces. Here, an effect emerged for positive, but not negative, behaviours. While untrustworthy faces could be prioritised in memory, negative behaviours might contribute more to the strength of immediate judgements. Moreover, age-related attenuation complements work

showing age-related shifts towards focusing on more positive material. Although less stark than the reversals in focus shown in emotion work (see Carstensen & Mikels, 2005; Mather & Carstensen, 2005), a tendency to judge negative behaviours more strongly than positive may attenuate with age.

GENERAL DISCUSSION

The present experiments extend the literature on appearance-behaviour congruity in three ways. First, Experiment 1 replicates work (e.g., Cassidy et al., 2012; Kleider et al., 2012; Nash et al., 2010) showing better memory for congruent over incongruent face-behaviour pairs, while uniquely showing that congruent and incongruent pairs are better remembered than pairs with average faces. This suggests that even when appearance and behavioural cues conflict, they improve memory beyond when receiving less information. In Experiment 2, we used a similar manipulation to illustrate that congruity effects are not specific to memory. We show similar congruity effects immediately upon learning about others. Finally, we show congruity effects among older adults while revealing subtle age differences in their employment.

An important consideration of these studies is that faces were always shown before behaviours. If early presented information has more impact on impressions than subsequently presented material (Anderson & Barrios, 1961), appearances anchored impressions in the present work. Comparing memory and judgement strength after manipulating face/behaviour presentation order could test whether early presented information has the most impact on impressions. If order matters, showing behaviours first may increase memories of them, reducing distortion from appearances.

Age-related influences on congruity effects were more complex than predicted. In Experiment 2, congruity influenced older adults across approach judgements, and young across trustworthiness-related judgements given high arousal behaviours. Older adults could be particularly sensitive to congruity in the context of social interactions. Connecting to prior work, older adults may indeed make better use of trait-diagnostic information than young in some situations (Hess & Auman, 2001; Hess et al., 2005), while sometimes using schemas more than young (Mather & Johnson, 2003; Shi et al., 2012) to optimise the likelihood of positive social interactions.

A lack of overall age differences in the present studies may inform work evidencing differential processing of negative facial cues with age. When shown without additional cues (e.g., behaviours), older adults perceive untrustworthy faces more positively than young (Castle et al., 2012; Zebrowitz et al., 2013). Although this positive skew suggests difficulty in perceiving trustworthiness-based appearance-behaviour congruity, our data do not reflect this. The processing of valenced cues from multiple sources may be preserved with age in that the presence of behaviours could induce closer consideration of faces, reducing age differences. However, in Experiment 2, we did find age-related attenuation for stronger judgements given negative versus positive behaviours. While age differences in processing negative cues may exist, the presence of behaviours could ameliorate differences in judgements about faces. However, choosing stimuli based on age-matched ratings, like in Experiment 1, could mask the detection of age differences. It would be worth testing for age differences in a naturalistic setting, where stimuli are uncontrolled, to examine this idea further.

Because inconsistent information can pop out to perceivers, finding better memory and stronger judgements for congruent over incongruent information might seem counter-intuitive. Indeed, not all studies evidence congruity effects (for a review, see Stangor & McMillan, 1992). We predicted congruity (rather than incongruity) effects in the present studies because actor behaviours did not directly impact perceivers. Other explanations, including schema-expectancy strength and relatively large number of stimuli, could also account for congruity effects, however. Individual differences also predict the size of effects, as those believing that traits are fixed remember more stereotype congruent information (Plaks, Stroessner, Dweck, & Sherman, 2001). However, people learn others' traits better after exposure to congruent stimuli (Carlston & Skowronski, 1994), suggesting a strong role of congruity in impression formation. One reason why these findings might seem counter-intuitive is that people often claim objectivity in decisions despite their actual behaviour (Hansen, Gerbasi, Todorov, Kruse, & Pronin, 2014). Gaining a richer understanding of congruity effects is therefore important.

Like related work, these studies have implications for the legal system. Appearances contribute to jury behaviour, as facial maturity impacts the odds of conviction for negligent or intentional crimes (Zebrowitz & McDonald, 1991). If a person *looks* like he would have committed a crime and is convicted, that person may be given a harsher sentence than someone who committed a similar crime but did not look the part. Moreover, it may be easier to remember negative information about a person who allegedly committed a crime than positive, but conflicting, information. This suggests congruity could affect juror and eyewitness impressions.

Taken together, these studies enhance our understanding of congruity effects in social cognition across age. As appearances impact many outcomes, gaining a greater understanding of how appearance-behaviour congruity impacts cognition may more broadly inform our understanding of human interaction.

Supplementary material

Supplemental material is available via the supplemental tab on the article's online page (http://dx.doi.org/10.1080/09658211.2014.951364).

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